AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

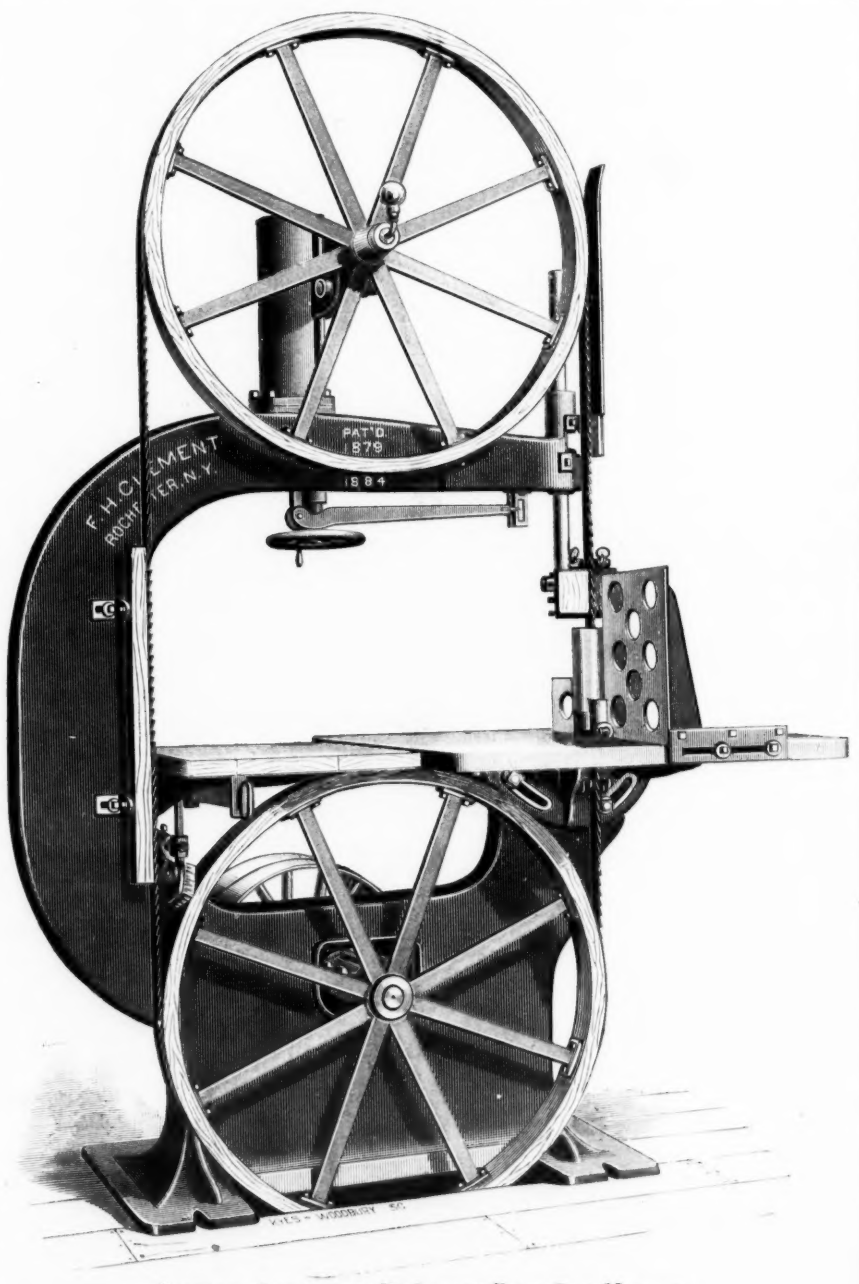
Combined Scroll and Re-Sawing Band Saw Machine.

The engraving represents a machine of this kind, made by Frank H. Clement, Rochester, N. Y. It is a powerful machine of its class, the frame being a heavy, hollow casting in one piece. The wheels are 42 inches diameter, with a face 3¼ inches wide, the rims being seasoned wood, glued up in segments covered with rubber and ground true; the whole being accurately balanced. The metal in the arms of the wheels is disposed so as to give strength and lightness. The upper wheel runs on a steel stud, and is arranged to be self-oiling.

The main guide has a combination adjustment, which permits blades from $\frac{3}{16}$ to 2½ inches in width, to be used. The blade is strained by means of a balance lever with an index. This is always elastic, to provide for expansion and contraction of the blade. The blade can be shifted on the face by means of a hand-wheel; this, like all other adjustments around the machine, being within easy reach of the operator, and made without the use of wrenches.

A belt-shifter and extension of the table over the lower wheel, also chip-guard and saw-brush, wrench, scarfing frame and tongs are furnished with each machine. An iron table is usually put on, but if desired a kiln dried, hard wood table is furnished instead. The capacity of the machine for splitting is up to 20 inches in width.

When ordered, power-feed rollers are furnished, which will take stock up to 20 inches wide and six inches thick, and saw in the center or at any distance out of the center, cut beveling for weather-boarding, etc. The feed motion can be instantly adjusted from slow to fast, or stopped altogether, by the operation of a single lever. This arrangement can be removed from the table in two or three minutes, leaving everything free for scroll work.



COMBINED SCROLL AND RE-SAWING BAND SAW MACHINE.

The Care of Boilers—Boiler Setting.

BY GEORGE MARSHALL.

The care of a boiler is ordinarily left to a man of poor judgment, small experience, and an entire lack of all mechanical knowledge. He is generally selected on account of his being a *cheap man*—that is, his daily wages are small—while in reality time proves him to be more expensive than a skilled mechanic. His boiler, pump, engine and all their surroundings bear unmistakable evidence of neglect, ignorance and carelessness. In time the pump gives out in such a way that the bill of repairs is almost as great as the original cost; the gauge cocks on the boiler are minus the wooden wheels which once adorned them, and the deposit of sediment in and on the glass water-gauge is disgusting. The steam gauge can hardly be read, on account of the accumulated dust and dirt; the engine runs with a dull *thud;* the joints on the boiler, steam chest and pump are leaky; and the general air of the place shows that the services of the skilled workman are very much needed to produce order. In addition, the extent of the knowledge of firing possessed by this engineer consists in shoveling coal in the furnace, regardless of combustion of gases or evaporation of water; and usually a heavy, thick, unburned mass of clinkers and cinders bear evidence to the waste daily carried on under his eye and by his hand. In the hands of a man of experience and education, the cinders usually carted away would maintain the steam required to run the machinery, and the skill possessed by such a man would almost do away with the expense of repairs.

The appearance of everything in and around the place would denote thrift and cleanliness, and the time of such a man—not devoted to the firing of the boiler—would be bestowed in perfecting the appearance of everything in his charge. Some engine and fire-rooms show the character of their keepers far better than all the testimonials or certificates which they could present, and the great wonder is that owners of factories requiring the services of such men do not read from their own surroundings the lesson which they can read from the appearance of others in contrast with them.

In the setting of the boiler sometimes the work is given to a man who has never had any experience in that line, and, as a consequence, defective, leaky walls, are the result. In using the word leaky, air leaks are meant, as, where a current of cold air is allowed to improperly mingle with the products of combustion, the loss of heat is perceptibly noticed, as well as the increased consumption of fuel.

Another point not fully understood, even by the majority of engineers and boiler-builders, is the space between bridge wall and bottom of shell to produce the best results from the combustion in the fire-box. If too large a space is allowed the gases generated from the coal will pass away unconsumed; if too small, the temperature of the furnace is in a measure impaired, and an increased consumption of coal without corresponding benefit is the result. Some prefer the bridge wall built up equidistant from the boiler shell; others prefer a wall straight across, but if the proper area is allowed between the boiler and bridge wall, one form is as good as another. Rules have been laid down, and tables of proportion have been published from time to time, but the subject of the proper area is one that can be best reached by experiment in each case. It is an easy matter for the owner of a boiler, if his coal consumption is too great, to add to or take from the area between bridge wall and boiler. A course of fire-brick laid on loosely, yet closely, will answer for a week's trial, and by removing them the following week, and noting the results, valuable information can be obtained, far superior to any table of experiments. In published tables, the conclusions arrived at have been reached by the use of a certain kind of coal. This coal may not be easily had by the user of the boiler who wishes to follow the experience of the engineer who made the tests, and the consequence is that the results will be entirely different from the published statement. For this reason each consumer should be guided by his own experience rather than by the experience of others.

The details of a shop or factory may be closely followed, to prevent an excessive expenditure or waste of material and labor, or to accomplish a reduction in the current expenses; yet too frequently it happens that the point where the greatest economy can be practiced (the fire-room), is passed unnoticed, from the fact that the owner or superintendent is practically ignorant of the science of firing, and the wasteful fireman is allowed to continue in his career.

The writer is personally aware of a locality where two boilers of the same dimensions are daily running, of which one consumes 2,600 pounds of coal, and the other 1 600 pounds in a day of 10 hours. Both were built by the same builder, from the same drawing, the material ordered of the same quality and from the same parties, yet the owner of the boiler using the greatest amount of fuel fails to see why his boiler is so much more expensive than the other. It might be thought that the engine in one case was doing more work than in the other, and in this way the difference could be accounted for; but the indicator, when applied to both engines, gives the greater horse-power to that where the least coal is used.

The secret of the increased consumption lies in the furnace and the fireman. In one case the furnace doors are thrown open, coal is freely thrown in and the doors left open, cooling brick-work and boiler. In the other small quantities of coal are frequently thrown in, and the height and level of fire equally maintained. In one furnace the average thickness of fire is four inches, in the other ten.

In addition to this cause, another is to be found in the setting. The setting of one boiler is determined from theory, the setting of the other from practice. In the boiler using the greatest quantity of fuel, "as a measure of economy" (notwithstanding the protest of the boiler-maker), the flame and gases are returned over the top of boiler, the intention being to superheat the steam.

It is only within a few years that steam users have become conversant with the necessities and care of their plant. I can remember numerous instances when the journeyman boiler-maker, when sent to make repairs on a leaky boiler, was looked upon in the same light as the physician called on to attend in a critical case. His word was law, and his recommendations unhesitatingly followed. The inspection laws of the different States and cities removed, in a measure, the importance of the boiler-maker, and now the

advice of the inspector receives attention formerly accorded the boiler-maker.

Money, in some instances, has been unsparingly squandered when the advice of an interested boiler-maker was followed. Flues have been taken out and thrown away, sheets have been cut out of a boiler, new flues and new sheets put in, when all that was needed was a good-sized patch, and flues enough taken out to permit the holding on of the rivets. Instances are not rare where boilers have been repaired at an expense exceeding the original cost of boiler, and this was done by unscrupulous parties who thought only of their profits.

An Engine Designed by Oliver Evans.

There has been remarkably little work done in this country in the way of preserving mechanical antiquities, although the ordinary run of people are by no means indifferent to the historical value of machines of an ancient type. At the Centennial Exposition the old machinery and pioneer engines attracted constant attention, and at the late exposition of railway appliances at Chicago, the curiosity shop occupied by old locomotives and cars was constantly crowded with people eager to learn every detail of the history of the curiosities on exhibition. These indications of the general interest in engines with a history induces us to illustrate the Oliver Evans engine shown on this page.

This engine is still at work driving the fans in the I. P. Morris Port Richmond Iron Works, Philadelphia. The history of the engine is not known to this generation, but tradition says it was placed in its present position in 1843. The engine is of the Evans grasshopper type, and it is understood to have been built from Evans' designs. Since being put in the Port Richmond Works it has had a new cylinder, and a beam of wrought iron has taken the place of the original one of cast iron. There are several more engines of the same pattern driving fans at glass works in New Jersey and Philadelphia, and they run with remarkably slight repairs.

This engine has a cylinder 8″x18″. The steam-chest is set diagonally across the middle of the cylinder, and steam is introduced through passages round the cylinder. The piston operates a horizontal beam, which transmits the power to a crank. This engine is, in some details, an improvement on Evans' Columbian engine, which has the right to be considered the prototype of the high pressure engine. Had Evans received the encouragement and assistance in this country that Watt did in England, there is every reason to believe that America might have had the undivided honor of giving the world the high-pressure engine. In 1786, Evans applied to the Legislature of Pennsylvania for a patent on a high pressure engine, but it was refused. In refusing to encourage the plans of a native inventor, the Pennsylvania Legislature merely followed the policy pursued by the national rulers for many years, and not altogether abandoned in some quarters to-day. A sentiment was industriously spread that our native inventors could not compare with foreigners. This sentiment has succeeded in obscuring the reputation of Fitch, and Evans, and Stevens, that Watt, and Boulton, and Trevithick might be exalted. Through the same spirit the labors in behalf of locomotive engines done by Cooper, Ross Winans, Davis & Gartner, and others is depreciated, that George Stephenson might receive honor for deeds he never performed.

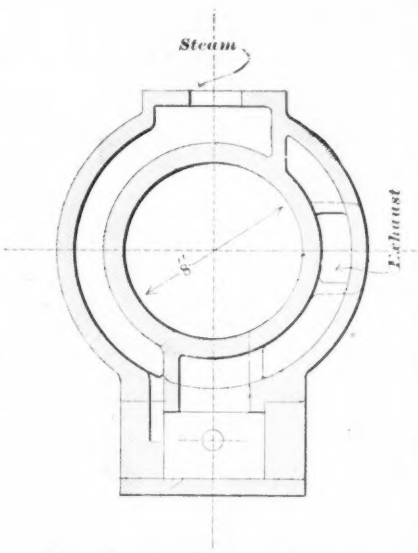
A recent report of a test of the Noteman Rotary Engine, by Prof. R. H. Thurston, contains the following:

"The Noteman Rotary Engine, upon which I have been requested to report, has exhibited an economy in its use of steam equal to that of good reciprocating engines of the size and class with which it is expected to compete, and greatly superior to that obtained with the average engine of either class, so far as my knowledge and experience have gone. It has shown itself to be capable of turning its shaft with all the regularity claimed as the peculiar merit of rotary engines. It is remarkably free from tendency to shake loose from its foundations, and can be made to give practically as good a distribution of steam as is found in reciprocating engines of the same size and of good make. It can easily make the speed proposed for it, and can develop a greater power than that at which it is rated. Some minor defects of plan and construction exist which are, however, easy of remedy, and, being remedied, I see no reason why the engine should not do even better than during the test, and prove to be a rival of the reciprocating engine, such as it is here compared with, and permanently successful. The one matter to be now decided is its durability, and the perfection with which it can be made, and kept, steam tight at wearing surfaces. This can only be determined by experience, and I shall look with interest and with hopefulness for success in that direction as elsewhere.

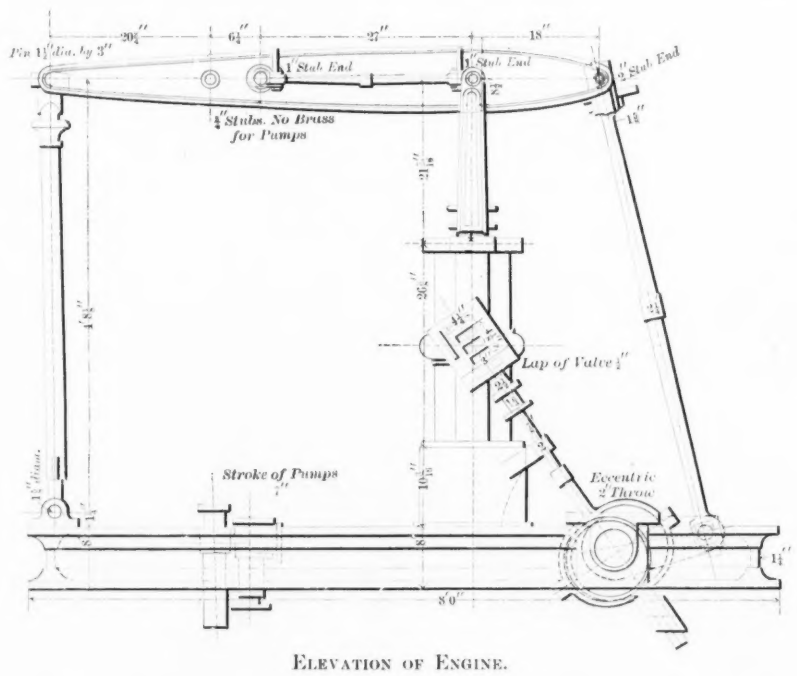
"The results above detailed are unlooked for, and will probably surprise other engineers quite as much as they surprised me. I am therefore of the opinion that your clients, the builders of the engine, could find it advisable to try to adapt the plan here adopted to larger sizes, in which still better results should be reached."

At the beginning of the year the Philadelphia & Reading Coal Company abolished their stores at their various mining centers. This company has for years run stores for supplying their employes with household goods, and there does not seem to have been any reason for complaint about the system. The decision to abolish it indicates that the management of the company thought it better to leave the men to purchase their goods wherever they saw proper. The tendency of a company store system is to make men improvident, and their abolition in all labor centers is very desirable. It would be a good plan for the workmen to try co-operation where company stores are abolished, and by combining to purchase goods at wholesale obtain the benefit of lowest prices. This is a kind of combination that would produce good returns, if properly managed.

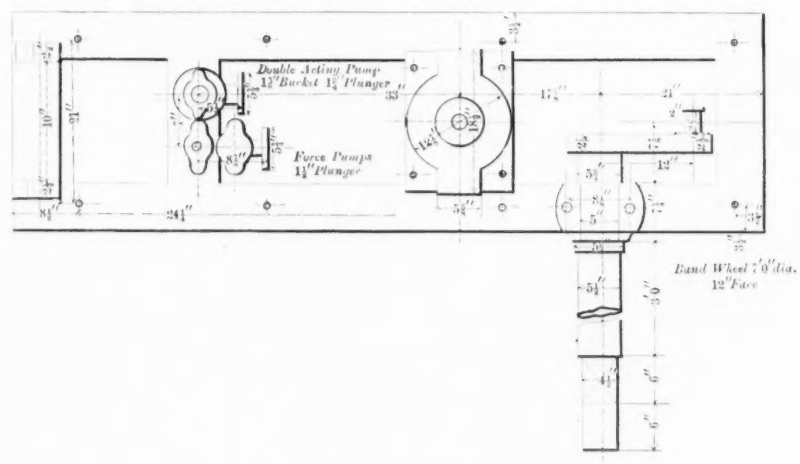
Some parties in Pittsburgh are building a car to carry compressed gas. This car will hold 2,000 cubic feet, at a pressure of 100 pounds to the square inch. The builders of the car believe that gas can be transported cheaper in this way than in pipes.



CROSS SECTION THROUGH CYLINDER.



ELEVATION OF ENGINE.



PLAN OF ENGINE.

Mr. George Barclay Brace, C.E., who represented the British Institution of Civil Engineers, of which he is vice president, at the opening of the Northern Pacific Railroad, has written an interesting "address" on the subject of his trip to the Pacific Coast. Mr. Brace takes an eminently practical and sensible view of the American methods of railroad building, and his address is full of admiration for the wonderful sights he enjoyed. He appeared to properly appreciate our methods of saving labor in railroad building by using machinery in many cases where the shovel is required to do similar work in Europe. The rapid growth of towns and the turning of a wilderness into prosperous farms, at marvelous speed, received admiring attention, besides numerous other features of North-Western life. In one of the public processions got up to welcome the visitors, Mr. Bruce noted a characteristic inscription. It said, "Modesty is a great virtue but you can get on better without it."

The Emperor of Germany recently visited a needle manufactory and was much struck with the fine work turned out by machinery. He was particularly surprised at the accurate work of punching the eyes of very fine needles. The workman who was punching the needle holes asked for a hair of the monarch's head, which was given him, when he made a hole in the hair and put a thread through the hole.

Locomotive Cab Burned.

While a locomotive engine was running a train on the Lebanon Valley Railroad, Pa., last week, a flue burst and stopped up the stack, throwing the flames out into the cab. Before the fire door could be closed, the woodwork of the cab took fire and forced the engineer and fireman to jump to save themselves from being roasted alive. Fortunately the engineer shut off steam and applied the brake before quiting the engine, so the train soon stopped. The cab was completely destroyed, but no other damage was done to engine or train.

Professor Huxley on Technical Education and Trade Competition.

In presenting the prizes to successful students in a London technical school lately, Professor Huxley took the occasion to urge the necessity for combining skill in handicraft with technical knowledge. All his life he had been trying to persuade people that if they wanted to teach physical science it was no use to proceed by filling the minds of the students with general propositions which they did not understand, from which they were to deduce details which they comprehended still less. At present the scheme of technological education in connection with which the prizes were given, extended over 150 centres in different parts of the country, embracing nearly 3,000 examiners. Six years ago none of these schools which were for the education of workmen were in existence. He had not the smallest doubt that before this generation passed away, instead of 150 centres at which such examinations were conducted, they would be counted by hundreds; and instead of two or three high class places of technical instruction, they would be counted by the score, and that they would have in the central institute the great uniting point for the whole net-work through which the information and the discipline which were needed for carrying the industries of the country into operation would be distributed into every locality. These were places where every young artisan of industry and ability could receive encouragement to his ambition. Everything which spreads a knowledge of technical processes among our industrial classes tends to fit them for the great battle of competition. This struggle every day becomes more difficult because on the other side of the Atlantic there is a people numerous as ourselves, of the same stock, blood, race and power, who will run us harder than any competitors have hitherto done.

Arrangements are being made to carry out important engineering operations at Tampico, Mexico, with the view of opening the harbor for admission of ships drawing any draft of water. That town possesses one of the finest harbors on the Atlantic coast, but its entrance is badly obstructed by sand-bars. French engineers, whose influence in Mexico is very potent, were consulted about improving the entrance to this harbor, and they reported that any change to materially increase the depth of the channel was impracticable. Capt. Eads, of Mississippi-jetty repute, was then consulted, and he reported the designed change perfectly feasible. Tampico is a terminus of the Mexican Central Railroad, which passes through a rich mining and timber country in the vicinity of this port. When the bar is cut through, as it should be, and as it now seems probable that it will be, the probability is that Tampico will prove an active rival for Vera Cruz, diverting a considerable portion of the trade from that city.

The *Mexican Financier* calls upon its Mexican contemporaries to lend their efforts and influence in bringing about the suppression of evils connected with the operating of railroads in that country. A common practice among the peons is to steal spikes, leaving the rails with nothing to hold them, and other interference with the track is of daily occurrence. This is a continual source of danger and annoyance, which public sentiment, aided by vigorous action of the criminal courts, could quickly extinguish.

Billings' Drop-Forged Machinists' Clamp.

The common machinists' clamp is made by drilling two flat bars, and tapping one of them for screws. Although such clamps are extensively used, every machinist knows their weak points, that is that drilling the bars weakens them to such an extent that they must be made unnecessarily heavy and clumsy, often defeating the practicability of using them where they would otherwise be very convenient. The clamp shown herewith is drop-forged from bar steel, and is of such a form as to secure the required strength with the least amount of metal permissible. In other words it provides a tool to take the place of the old make-shift arrangement—one that will commend itself to every machinist and tool maker.

These clamps are made by the Billings & Spencer Company, Hartford, Conn.

The United States Consul at Tampico, Mexico, reports that the American hardware trade is suffering in that locality through inferior German imitations being passed for the genuine article. Our manufacturers held almost exclusive possession of the trade in axes and cutlasses, and certain kinds of cutlery, which is being pushed aside by spurious German articles made with American brands.

The Value of Labor.

BY CHAS. A. HAGUE.

The article in your issue of January 24, by Mr. S. W. Goodyear, deals with a very important matter, and it is safe to say that thousands of dollars are annually expended to no purpose, through efforts to obtain abnormal equivalents from what is too generally recognized as "cheap labor." The cheapness or dearness of labor, or anything else, depends entirely upon the relation between the cost and the usefulness of the article. The mere nominal price paid corresponds to the market value, but not always to the imaginary value set upon it by well-intending but not well-informed persons.

In employing labor, the main principle to be observed is the relation between the quality of the labor and the character of the work. If this be truly, and therefore practically, proportioned, the rate of wages cuts no figure whatever, because the *least cost of product* is the object and aim of all systems and regulations.

Tools, gauges and jigs, however perfect, will not of themselves make anything come right. The thousand-and-one matters of detail met with in every-day work are the elements of education needed by any and all workmen, to enable them to accomplish any prescribed task up to a certain quality, and in the least possible time. The nature and construction of gauges and tools must needs be understood and appreciated by the workman, to enable him to utilize tools and time to the best advantage.

The one or two instances concerning the misuse of drills and milling cutters, cited by the writer of the article in question, are, as he well knows, but samples of the many, many causes which lead to disaster and ruin.

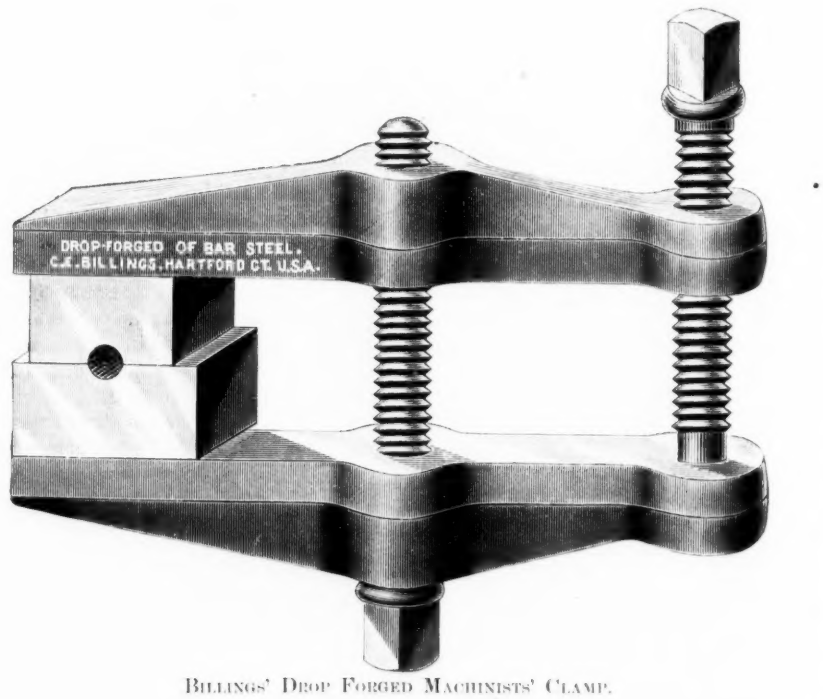
Although firmly believing that questions of humanity, good management and success are closely related, I will dismiss the consideration of all such ideas with the single remark that men at work in shops and factories are better contented, and are mentally and physically of the greatest value to their employers, in comfortable, well-lighted shops. People who employ labor, and calculate upon getting the worth of their money out of it, do not have time to find out the reason why men will not work by the piece at as low a figure as they are satisfied with when hired by the day. The question reaches into the realms of mental philosophy, and consequently out of the reach of shops and factories. Whatever the reason may be, the fact is, with us, that a workman expects to make a little more when by the piece than by the day: and, no matter how much money one may be willing to lay out in experimenting with new men, it is to be feared that the result of it all will more strongly demonstrate this fact.

The interest upon and depreciation of a manufacturing plant, together with costs of power and expenses necessary to operate, independently of cost of labor in producing goods, are constant factors: and, of course, with any certain volume of business, the less the value of plant, of power, and other expenses, the less will be the "dead load" to be carried. Again: inasmuch as the cost of the net power required for work, and the price paid for the actual producing labor is embraced in the cost of goods, these are independent of the "dead load," and hence the magnitude of plant, sum of expenses, &c., depends very largely upon the quality and adaptability of the labor; assuming, of course, that the kind of machinery and appliances are what they should be.

Among workmen, varying by their disposition and style, by their skill, and by how much they think they know, there exists a certain grading of acceptable wages. A rate per day that some will work steadily for, others will not put up with at all. In piece work, if a rate per day is set, and above which no one, however able, is allowed to go, the result will be to drive out all workmen who are not satisfied with the limit, but who could far exceed such limit at the price per piece at which less capable men just reach the limit. The direct effect of such course is to abnormally increase the size of plant and all attending expenses.

As an example, note the following: A is satisfied to work for $1.50 per day; B will leave the job if he cannot make $2 per day. The price per piece is one cent. A finishes 150 pieces per day: B, by superior ability, can do 200 pieces: then in four days A makes 600 pieces, and receives $6: but B can finish 600 pieces in three days, receiving also $6. The work costs no more per piece, but by employing B we save one day's use of shop room and machine. We have a superior workman to put at something else, and the chances are largely in favor of such a man doing better work.

Just how to grade the application of labor to any certain line of manufacturing is a question that calls upon the practical ability and knowledge of the business possessed by the person in charge of the work. The meeting of competition in the market very often pivots upon this very point. The commercial branch of the business, or that which attends to the selling of and getting paid for the product, is possibly the most important, but the business manager can be most unmercifully handicapped by heavy expenses and too costly goods, by reason of a lack of the autocrat principle in the management of the manufacturing departments.



BILLINGS' DROP FORGED MACHINISTS' CLAMP.

Improved Steel Work Appliances.

John Gjers, of Middlesborough, England has received five patents in this country for apparatus designed for equalizing the temperature of steel ingots. This is the patentee of the soaking pit, which was invented for a similar purpose and has been very successful. The soaking pit is merely a pit lined with firebrick, into which the hot ingots are put till their temperature gets equalized. When the ingot is first taken out of the furnace the heart of the mass is in a partly molten condition, which makes it unsuitable for rolling until it has partly cooled. In the open air the cooling takes place too rapidly sometimes, and the ingot has to be reheated before it can be rolled. The brick lining of the soaking pit maintains an even temperature and permits the ingot to be kept at the proper heat for rolling. The Edgar Thomson Steel Company have adopted the soaking pit system, and find it works well.

The new patents granted to Gjers are for apparatus having the soaking pit idea extended. There is a portable car having an ingot cell built in the middle and adapted for transportation to any part of the works. Another apparatus has a series of horizontal chambers resembling pigeon holes formed in and extending through a mass of brick work arranged so that ingots can be put in at one end and taken out at the other. The other appliances are of a very practical nature, and will no doubt be found useful in our rolling mills.

Discovery of Ancient Bronze Implements.

Metal tools and implements have performed such important functions in the development of civilization that nearly every one interested in history is interested in following the growth of metallurgy. Without metals there could be no tools except those of the crudest kind: and without good tools there could be none of the comforts, refinements, and intelligence that make people civilized. For years there has been a difference of opinion among antiquaries as to what metal was first called into use in the service of mankind. The investigators of the subject have taken two sides. One party contend that bronze was the first metal used for tools, implements and weapons, and they furnish numerous archæological discoveries as reasons for their belief. The other side believe that iron was the first metal worked to any considerable extent, and their claims seem to be substantiated by convincing evidence from history, philology, and various other sources.

Discoveries recently made through the depression of the waters in some Swiss lakes have brought forth important evidence in favor of bronze having been the first metal for tools to succeed the stone age. On these lakes a prehistoric race of men lived in dwellings erected on piles driven into the bottom of the lakes. Secure from the violence of land tribes, this people must have lived in these lake dwellings for hundreds of generations. Through the subsidence of the waters, antiquaries have been able to search under the lake dwellings, and interesting discoveries of tools, implements and ornaments have been made. The principal laborer in this field of research was Dr. Gross, of La Neuveville, who has published a book containing a detailed account of his discoveries. In the lower strata he found articles which showed that the dwellings had been commenced during the stone age, when no metal of any sort was used by the people. Further up comes rude implements of bronze, which gradually are succeeded by articles that indicate increased skill in working bronze. The mass of this metal found in the upper strata under the lake dwellings led Dr. Gross to the conclusion that the people had reached a considerable degree of civilization, and that they possessed as much metal, in proportion to the population, as is now to be found in an ordinary prosperous village.

Smoke Consuming with Locomotives.

A writer in the *Locomotive Engineer's Journal*, who has an excellent letter on smoke consuming in locomotive fire-boxes, makes a somewhat novel proposal as a fire-box improvement. He says: "I have thought for some time, and would like to see it tried, for I think it would give satisfactory results, that it would be well to divide the fire-box into two separate compartments by a fire-brick wall. Starting from below the first row of tubes the wall should be carried to above the fire-door opening, the same as the water-arch; but instead of one opening, as the water-arch has, this wall is to be perforated with two or two and a half inch holes running through it, and as close as would be consistent with strength. The fact of the air and gas being subdivided in passing through these holes and over the incandescent surface of the brick would effect a better chemical combination than would be possible in passing through in the form of one large stream, as in the case of the ordinary arch opening.

Depression of Trade in a British Colony.

A correspondent of *Engineering*, writing from Algoa Bay, South Africa, gives a most discouraging picture of business in Cape Colony. Profound stagnation in all lines of trade is intensified by misgovernment. The railroads, although expensively constructed, are the laughing stock of caricaturists for the crude way they are operated; and, in some cases they stop short in sight of points where good trade could be obtained. The docks are badly planned, and the tramways rickety, and public enterprise is on a par with the colonial works. Yet, though many workmen are idle, many immigrants continue to arrive, and the correspondent advises them, and others contemplating emigrating, to direct their way to America, where he predicts they can easily get work in the railways and mines about to be opened in West Virginia, North Carolina, and Tennessee. He also says, "complaints are now arising about the Joy valve motion, as the dust and grit damage it seriously, and at Cape Town some engines have been altered to the old link motion."

A correspondent of the New York *Sun*, writing from Mexico, says:

"Wages are steadily increasing in Mexico. In the capital common labor receives $1.25 a day. Mechanics get from $1.75 to $2.25. Along the railroad lines the prices are about $1 a day for unskilled laborers and $1.50 to $2 for mechanics. The laborers from the rural districts are coming in to the railroad districts in large numbers."

Canfield's Safety Stop for Elevators.

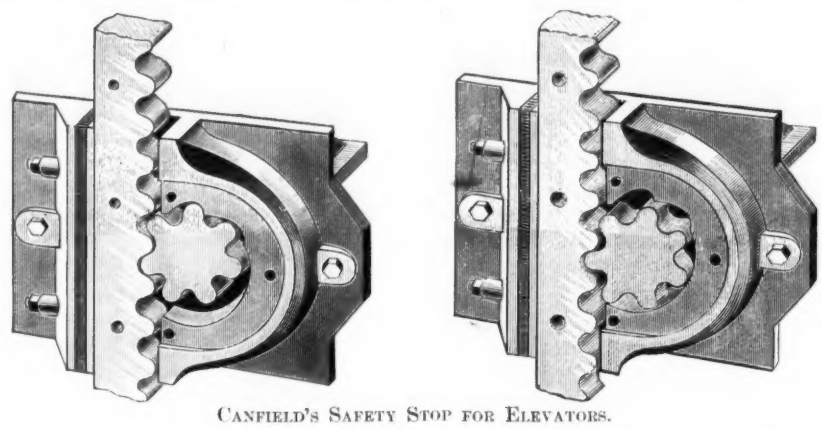
The engravings show the device both open and closed. As will be seen, substantial racks are used instead of the usual guide racks. These racks, having strong, blunt cogs, are firmly fixed to the guide-posts. In place of the ordinary guide-boxes, boxes of much greater strength are attached, one to each side of the car. These boxes are chambered to receive a small pinion, having teeth corresponding with those of the rack. In use, these chambers are covered with metallic plates, not represented in the engravings. This pinion is not journaled, but is left free to revolve in the recess. While the elevator platform is in use at ordinary speed the pinion and rack will work together without interfering with the motion of the platform in either direction. When, however, a rapidly increasing speed downward occurs, as from the breaking of the suspension rope, the guide-box overtakes the pinion, and it is locked in the recess, positively arresting the platform, until it is raised and suspended.

A rubber cushion in the guide-box relieves it of the shock incident to the sudden stopping of the car. A similar cushion is applied to the flange projecting from the back of guide-box under the frame of car.

It will be seen that the use of levers, springs, and similar appliances are dispensed with, the device possessing the merit of extreme simplicity, working from the unchanging effect of gravity. The parts being in constant use are always in condition to operate, either when the rope breaks, or when from the defect in the machinery the motion is unduly accelerated.

Tests of the holding qualities of this device, made at the Watertown arsenal, and of the reports, of which we have been shown a copy, show the strength to be much above the requirements.

This device is the invention of F. P. Canfield, 104 Utica St., Boston, Mass.



CANFIELD'S SAFETY STOP FOR ELEVATORS.

When Mr. George Barclay Brace was traveling through the United States, in a recent trip to the opening of the Northern Pacific Railroad, he was particularly struck with our magnificent river steamers. He thought there could be nothing finer than the Pilgrim of the Fall River and New York Line. After returning to the Mersey he confessed to feeling small in being transferred from a Cunard steamer to a wretched tug boat where there was not a dry seat to sit upon, and nothing to keep off the rain.

Brooklyn Mechanics' Club.

At a recent meeting of the Polytechnic Association of the American Institute, Cooper's Union Building, New York, Mr. T. P. Pemberton read a paper on mechanics' clubs, from which we abstract the following:

"Within a year there has been established in Brooklyn a Monday evening workingmen's meeting. The movement commenced with the appointment of a committee of four, who were authorized to use their own judgment in organization. They procured comfortable rooms and furnished them, providing attractive reading matter and amusements. Men were then called upon to attend; at the first meeting only four attended. The committee were discouraged, but they persevered. They sent out 300 circulars announcing the object of the meetings, and the next week 25 men responded to the invitation. From this time the interest in the meetings increased and the attendance became encouraging. Lectures, readings, instrumental and vocal music were introduced, and a library was started. Three gentlemen each gave 50 books, and the cases now contain 800 volumes. There are 84 members on the register, and they show increasing interest in the meetings of the club. Two old men walk a mile and a half to attend the meetings, and are the happiest there.

"Such is the mechanics' club on a small scale. We think that similar clubs can be established throughout the country, certainly in all manufacturing cities and towns. They can be started by mechanics themselves, or by employees, superintendents, foremen or others interested in the welfare of workmen. Fifty men subscribing a small sum each month can secure the possession of a quiet, comfortable room for mutual intercourse."

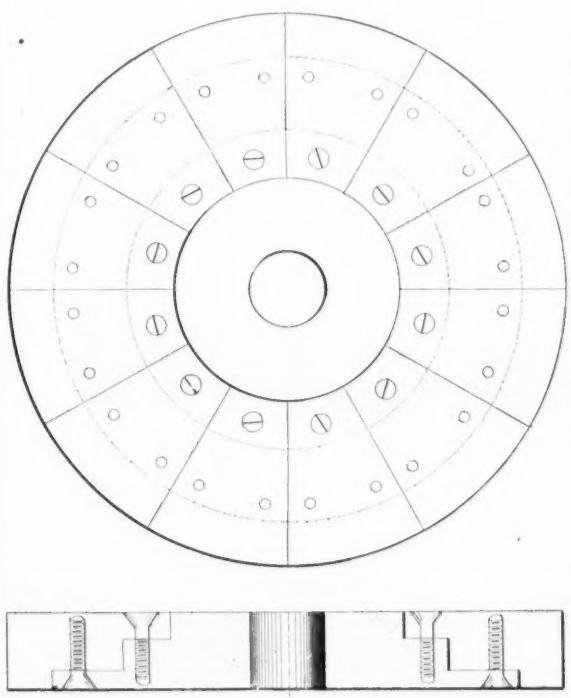
LETTERS FROM PRACTICAL MEN.

Wooden Toothed Back Gear.

Editor American Machinist:

S. Q., who asks in your issue of Dec. 29, can make a wooden back gear for his lathe that he can depend upon as follows, and seen in sketch: Make iron blank 1 inch smaller than required gear, cut it in two steps, and drill for screws as indicated. Take the hardest thoroughly-seasoned mahogany, and cut it in, say, twelve parts, adjusting so that joints will come between teeth. Glue, and turn to fit iron; then screw together. Turn blank, and cut as if of iron.

I made a town clock 25 years ago, using wood in this manner—an amateur job—and the last I knew of it, three or four years ago, it was still in service. G. W. PEARSONS.



WOODEN TOOTHED BACK GEAR.

Turning Thin Disks—Building up Surface to Fit.

Editor American Machinist:

If people would think more and growl less at their misfortunes they would be better off. I once knew a man who was building a small engine, $1\frac{3}{4}''$x$2\frac{1}{2}''$. I watched his progress, supposing that when he came to the piston-head there would be music, but I was disappointed. The followers were made from sheet brass, $\frac{1}{8}''$ thick, with $\frac{1}{4}''$ hole through them. As he had nothing but a 20″ lathe—a poor one at that—I did not see just how he was to get along. But he put one of the followers on a mandrel, drove it on a little, and then put the mandrel on the centers. Then he rapped it till it ran true sideways, took it to the tinsmith's bench and soldered the disk to the mandrel, building up the solder quite a distance on one side. He then put it into the lathe, turned off the edge and faced up the side not soldered first, then the soldered side, cutting away the solder the last thing

Since then I have often made use of the information gained by observation in squaring up thin iron washers, &c. I have often seen rollers, such as are used in cotton machinery, come loose in the neck when driven together, taken apart, tinned over and driven together again. They have lasted a year or two with nothing but the tin to hold them. PACKING.

A Boiler Explosion Accounted For.

Editor American Machinist:

My attention was recently called to a boiler explosion, which, I think, shows evidence of about as much carelessness as any I have ever noticed. The boiler was of the open or cast front locomotive type, with fire-box 30″x42″x48″; shell, 34″ diameter; with 26 tubes, 3″ diameter and 6 ft. 6 inches long. At the time of explosion the engine was standing still, having been stopped to get up steam. They were in the habit of carrying 65 pounds steam, but the engineer—a boy about eighteen years old—concluded he wanted more, so he shoved the ball out on the lever of the safety valve. At the time of the explosion the order had been given to start up, but this not being done the foreman came to see the reason, and stood in plain sight when the boiler exploded, passing through a portion of the building, breaking in its passage six pieces of timber each 6″x8″, and two pieces each 8″x8″. Three men were killed.

An examination of the boiler after the explosion revealed a break on the front of ash-pit or water bottom, extending up on each side to the first row of stay-bolts, which was situated—measuring from a line drawn from one stay-bolt to another, 14″ from bottom of shell, or 12″ from bottom of ash-pit.

The crown sheet and top row of tubes were found coated with a scale similar to that on a piece of iron that has been welded. Examination of the lower glass gauge cock showed it to be choked with sediment, which accounted for the half glass of water, but no one remembered the gauge cocks having been tried during the time of stopping. The lower gauge cock was 2″ above crown sheet, and the first tubes 3″ below crown sheet; therefore, judging from the burned parts, the water must have been 6″ or 7″ below the lower gauge cock.

Explosions are generally said to be caused by crystallization, or the free use of drift pins, or they are dispensations of Providence; but what about engineers who allow the water to get out of their boilers while they are watching the fire burn?

FIREMAN.

A Query.

Editor American Machinist:

I would like to ask Mr. Frank H. Richards if his ideal chuck, shown in last week's issue, is put on lathes as shown in the sectional view. If so, which side of the lathe does the workman stand on? The drawing certainly shows a left hand thread.

APPRENTICE.

A Small Man in a Large Shop.

Editor American Machinist:

I hope that a recent article of mine, recounting some of the advantages of small shops, will not lead to over-confidence on the part of young men on going to work in a large shop for the first time. General knowledge may be thin in spots, as I said, and yet special skill may be, in some cases, astonishingly great; and this is one advantage of a large shop. I was cautious about this, but I had a narrow escape, if I may be allowed to call it an escape at all.

I had not seen any good chipping done in the shop yet. When the foreman asked me if I could chip, I replied that I could do a little in that line. He said there was a call from the stationary engine department for four good chippers—three had been found, and I might go as the fourth man. I tried to assume an "all the same to me" manner in order to conceal the real pleasure I felt in the prospect, saying as little as possible about chipping, being determined to let the work show for itself. The job consisted of two main driving pulleys, cast in halves, and we were to dress the cut sections to plumb and straight-edge, and bolt the two parts together. Each half had four surfaces to be dressed, two of which averaged about 7″x28″ each, and the other two were about 6″x 18″ each—no chipping strips.

Crawford and Hafferty worked on one pulley, and Libby and I had the other in another part of the shop. We helped each other to level up and lay off the work, but said nothing about chipping, and in a short time after chipping was begun I was glad for my silence, and made up my mind that if I could hold my own, it was all I could expect to do. We talked of various things, but not of our work, until toward night of the second day Libby said: "You must have chipped a good deal before now?" "Oh, little; not much," said I, and then I remarked that he seemed to have had considerable experience. "Oh, a little; not much,' he said, and then we both had a hearty laugh.

Then Libby asked if I had been over to see the work of Crawford and Hafferty; and upon my answering no, he advised me to go over, and then you will see, said he, that you and I ought to keep still about chipping.

I went—I saw—I gave it up. Such smooth, regular cuts, and such an amount of surface gone over in the time I had never seen before, nor have I ever seen it equaled since.

The two men smiled good-naturedly, and complimented Libby and me on the possibilities of our future. I was perfectly satisfied with having been detailed as fourth man in that party of chippers. It is not essential to the sentiment of this article whether these men acquired their skill in that shop or not. The important part is the lesson of caution.

OLD JOUR.

Marking the Speed of the Countershafts.

Editor American Machinist:

Amongst the suggestions published in your valuable paper, I have found many that were very good, and have one to offer, that, if adopted by the various tool makers, would prove a great convenience to those setting tools in a shop. It is that the makers stamp upon the end of the counter shaft accompanying each machine, the number of revolutions it should be run. J. J. S.

Case Hardening With Borax.

Editor American Machinist:

A recent communication about hardening steel with borax reminds me that I once met an old blacksmith who had been using borax for welding iron for a number of years. He one day accidentally discovered that if his weld was dipped hot into cold water, the iron would become case-hardened. After this, he always used borax for case-hardening. The iron is brought to a welding heat, dipped in borax, returned to the fire for a moment, and then plunged into cold water. If the iron is smooth at first, it comes out very white, and after the scale is removed the iron has the appearance of being tinned.

E. W. THOMPSON.

Comparison of Universal and Independent Jawed Chucks.

Editor American Machinist:

I am not a believer in the utility of the combination lathe chuck, for reasons which I believe I can make plain. My dislike is not founded on prejudice or theory, but on years of actual practice.

In the first place, consider the three-jawed universal chuck. For some classes of rough work this chuck is all right, but all work is not rough; some is finished, and must be chucked true with the finished part. The three jaws of this chuck are supposed to move exactly together, but do they? Looking at Fig. 1, suppose the wrench is applied, as shown, at screw *A*. Now, this screw transmits motion to *B* and *C* through the rack, and supposing the chuck to have been accurately trued up when made, the jaw, operated by screw *A* will be advanced nearer the center than those operated by *B* and *C*. Apply the power at *B*, and *A* and *C* will be furthest from the center, and so on. This is, of course, owing to back-lash, which increases with use. If by any means the jaw to which the power is applied is trued, it will be just twice as far out of the way when the power is applied to either of the other jaws.

Now, take the three-jawed independent chuck. I have been in a good many shops, and never saw but one or two independent

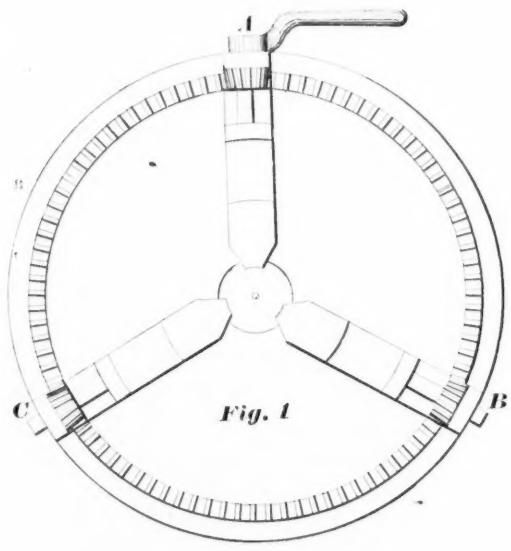


Fig. 1

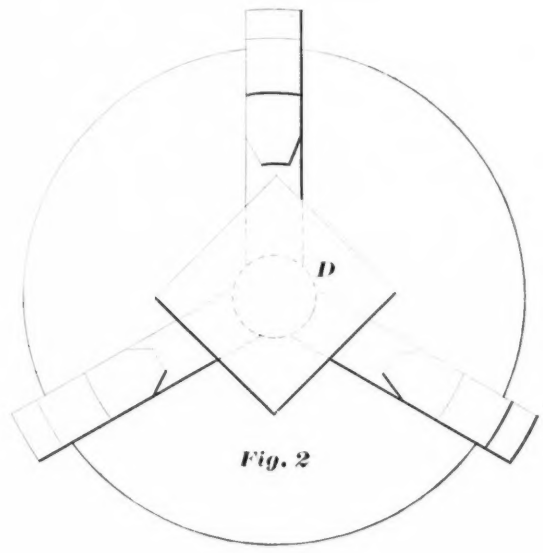


Fig. 2

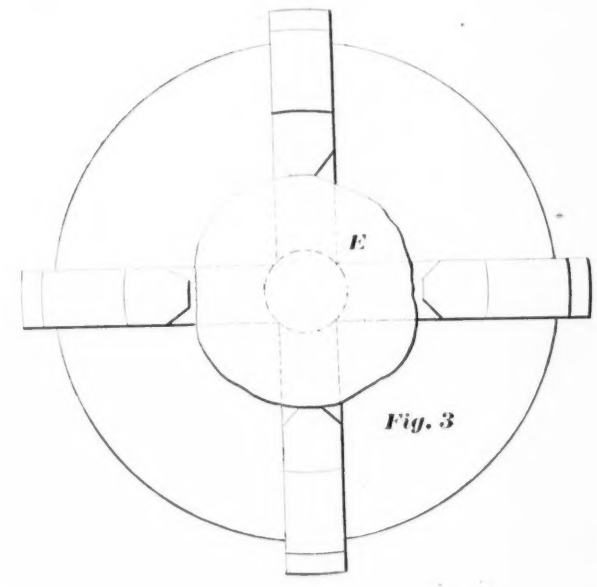


Fig. 3

three-jawed chucks. If the three-jawed chuck is right, why are they not used with independent jaws? They are good for such round work as can be done in a universal chuck; but when you have irregular work, which is the kind usually done in an independent chuck, they are a failure. Suppose it is desired to chuck such a piece as shown at *D*, Fig. 2. It can only be done by a tedious process of blocking up.

In my opinion, the four-jawed universal chuck is entirely useless. One of my reasons for believing this is the fact that after short use the jaws cannot by any possibility move together. Again, suppose you wish to use this chuck for holding a rough or irregularly-shaped piece, as *E*, in Fig 3. As will be seen, only two of the jaws will "bite," thus providing a very insecure hold.

Every one knows what can be done with the reliable four-jawed independent chuck. You can, with it, hold square as well as round work, irregular as well as regular. Work can be trued up, in it, with any degree of accuracy, and its accuracy is not affected by use. With all its advantages, it possesses the merit of being cheap. F. H. F.

Control of an Indicator Improvement.

Editor American Machinist:

We notice in your issue of Dec. 22, 1883, a communication from Mr. W. Barnet Le Van, relating to the improved revolving pulley arrangement, recently adopted by us, on our Thompson Improved Indicator.

We do not claim the originality of the improvement, but we have purchased from the original inventor, Mr. Stanek, of Prague, the sole right to manufacture it, for the territory of the U. S. A.

By virtue of our purchase, we alone possess the right to use it, and all Thompson Improved Indicators, sent out by us, will be equipped with this important improvement.

American Steam Gauge Company.
Boston, Mass.

Turning Three-Ring Packing.

Editor American Machinist:

Considerable having been written about turning packing rings, I am reminded of a wild western kink for turning three-ring packing that worked very satisfactorily. First, the outside rings were bored, turned, one side faced true and cut off the piece, leaving an allowance for facing. A steady-pin was fitted on the side that was trued up. The inside ring, which was to be 3″ wide when finished, was chucked, roughed out for a width of $3\frac{1}{2}$″, then bored to size for a distance of $2\frac{3}{4}$″. This left considerable stock for the remaining $\frac{1}{4}$″, as the casting was made thick to secure sound stock when finished. The outside was turned so that the two rings would fit, and the ring nearly cut off, or down far enough so as to caliper a little less than the inside diameter. Now the outside rings were put upon this as a mandrel, and faced to width required, after which a light cut was taken over the inside ring so the outside ones would be an easy fit, and the inside ring was cut off by boring out the remaining $\frac{1}{4}$″ referred to. By having a shoulder on the pattern at the width of the ring, a good deal of boring would be saved.

P. C. FORRESTER.

The Equidistant Series of Gear Cutters.

Editor American Machinist:

The treatment of the above topic, in my treatise on "Kinematics," is, I observe, subjected, in your issue of January 5th, to certain strictures by Mr. George B. Grant.

To fair and honest criticism I make no objection, nor do I feel obliged to dispute with Mr. Grant upon the point which he mentions. But his "plain language" is so chosen as to convey, chiefly, false impressions, and for the benefit of those who have read only his singular comments, I beg leave to state that—

1. What Mr. Grant calls "*the assumption*," on which my process is based, is in reality a plain statement of a fact which Mr. Grant himself subsequently admits.

2. My process, which Mr. Grant asserts (without proof) to be merely approximative, is, on the contrary, one which gives results exact, to a single tooth; and the reasons why it is are fully and distinctly stated.

3. Mr. Grant has, carelessly or carefully, concealed the fact that my process is absolutely identical with what he himself next coolly sets forth as "the most perfect method possible."

4. Considering this, and also my admission that even correct results might in some cases be obtained by his formula, it is hardly graceful or grateful for him to complain that in a selected example our figures differ but little. But Mr. Grant implies that the difference between our results will *always* be "an imperceptible fraction;" which is very far from being true.

5. Mr. Grant does me honor overmuch in asserting that my process "can be comprehended and applied only by an expert mathematician." The computation of the tables, from which he quotes, involve nothing more than the ordinary operation of elementary plane trigonometry.

PROF. C. W. MACCORD,
Stevens Institute of Technology.

Pattern Making—Allowance for Shrinkage and Finishing.

Editor American Machinist:

Your correspondent on pattern making, in issue of January 5th, must have had experience with a class of men working at a trade they never learned, such as house carpenters and flask makers who have contrived to get into pattern shops as "cheap men." If he will visit the works here (William Cramp & Sons) he will find pattern makers who do not trouble the moulder about the construction of patterns, loose pieces, &c. Neither does it take a week to read the drawing, nor a month to make the pattern, saying nothing about contriving.

Our foreman understands his business, and if we think we see an advantage in some peculiar construction of pattern we consult him. Pattern makers here can both read and make a drawing, and they understand that castings of different shapes will shrink differently. Parts to be finished are always indicated on the drawing, and all the extra expense of removing superfluous metal in the machine shop, about which your correspondent complains, is avoided.

We have, as all shops of any note do, a standard system of shrinkage. Ours is as follows:

For Loam Castings	$\frac{1}{2}$″	per foot.
" Green Sand Castings	$\frac{1}{10}$″	" "
" Dry " "	$\frac{1}{10}$″	" "
" Brass Castings	$\frac{3}{16}$″	" "
" Copper "	$\frac{3}{16}$″	" "
" Bismuth "	$\frac{5}{32}$″	" "
" Tin "	$\frac{1}{4}$″	" "
" Zinc "	$\frac{5}{16}$″	" "
" Lead "	$\frac{5}{16}$″	" "

There is no better system than this, that I know of, for marine work.

We allow for finishing large castings, say bed plates or housings, flanges, crank pin boxes, condenser flanges, &c., $\frac{1}{4}$″. For boring large cylinders, say 60″ to 100″ diameter, the allowance is from $\frac{3}{8}$″ to $\frac{1}{2}$″.

Philadelphia, Pa. W. G. H. O.

A Cure for Wet Steam.

Editor American Machinist:

I had an upright boiler supplying steam to an engine, and I experienced great trouble with wet steam. The steam-pipe was inch and quarter, and it was well covered with a good non-conductor, yet the steam came through so wet as to seriously impair its efficiency. As an experiment, I connected the steam-pipe to three branching pipes, connecting each of the three to a separate point at the top of the boiler. After this change, I got the driest steam I had ever used with an engine where super-heating was not employed. C. W. LECOUNT.

Dry Plate Photography.

Editor American Machinist:

Without entering into a description of the modern dry-plate process of photography, I wish simply to make a few remarks in favor of amateur photography among mechanical engineers. It is in the power of every intelligent person to become acquainted with the working of gelatine dry plates, and make of them a useful accessory to the shop or draughting room. It is very often desirable to have photographs of pieces of machinery or models turned out, or a copy of a drawing, and high prices are paid a professional photographer to do the work, who, of course, does not care to leave his regular business.

The outfit necessary is cheap, costing from $10 to $25. The directions are simple and easily followed without a knowledge of chemistry. The chemicals are few and inexpensive. The plates are always ready, and after exposure may be put away to be developed at leisure.

All that is necessary to learn is to expose the ready-prepared plate in the camera, to develop and to fix the plate—the three simple operations to make a negative. It is not necessary to bother with printing, as any photographer will make the prints for a few cents each. In any establishment where the "blue-print process" is used, the negatives may be printed in that manner, as blue prints will answer every purpose. I have taken negatives with a $15 outfit, which I am not afraid to compare with those of the average photographer.

There is a class of instruments that have been put on the market within the last few years under the name of "amateur outfits," which are especially adapted, by their compactness, light weight and small price, to the purpose mentioned. Architects are rapidly taking hold of dry-plate photography, and it certainly is as important to the other engineering professions. 5″x8″ plates are a convenient size to use, that size costing from $1.75 to $2 per dozen. For a dark room any small closet that may be made light-tight will answer every purpose. S. W. S.

Preventing Wear on Soft Spots in a Grindstone.

Editor American Machinist:

In reply to W. J. E., in Questions and Answers of January 5th, let him try beeswax on the soft spots of his grindstone. I have used it for that purpose. Warm the soft parts of the stone with a hot iron, and rub the wax on them; this will prevent them from cutting till the wax wears off. CAROLINA.

The Northwestern Railway Company of England have commenced building some freight cars, the frames being of mild steel. The steel used was made at Bolton, and was rolled specially for the work it is being put into. This is the first experiment of the kind made by the company. Should the cars prove satisfactory the intention is to work steel gradually into use for all kinds of car frames. Steel makers are deeply interested in the matter, and perceive in the new departure a new demand for the product of their furnaces.

Condition and Prospects of the Machinery Business.

LETTERS FROM LEADING MANUFACTURERS TO THE AMERICAN MACHINIST.

Continued from last week.

J. A. Fay & Co. (Wood Working Machinery), Cincinnati, O., write us:

Our business for the year 1883 has been entirely satisfactory, and our orders have amounted to a larger sum than in any previous year of our history.

We have added a few new tools to our equipment and have increased our facilities by arranging the new departments added in the two years previous.

We do not anticipate in the coming year an overwhelming demand for machinery, but we believe there will be a call for *good machines.*

We expect to have a healthy legitimate trade.

Our foreign trade still remains good and is gradually increasing.

The Hendey Machine Co. (Machinists' Tools), Torrington, Conn., write us:

Our business the past year has been about two-thirds that of 1882, and considering the general condition of business we are satisfied with the result.

During the year we have brought out some new tools. A 30 inch planer, which we build in three lengths, 8, 10 and 12 feet, and of which we have sold a number. Also a 30 inch stroke traveling head shaper, 72 inch traverse of head. This is a very heavy tool designed for railroad work. Of these tools we have sold two and now have two more in works. We have only added to our machinery what was necessary to enable us to build these tools to advantage, and we expect to push the large shaper all we can, as it is looked upon with much favor by those using it, and we think is a good tool, and will find its way into use.

We have built a foundry for our own work 40x100 feet, and now have it in good running order. Have put in a Colliau Cupola and Yale & Towne traveling crane, and are in shape to handle our work to advantage.

The outlook for the new year is not what we could wish, but as our trade has been improving for the past three months we trust it will continue to do so,and that we may have a fair year's business.

Lowe & Watson (Boilers and Feed-water Heaters), Bridgeport, Conn., write us:

At the close of last year we predicted a less amount of business and lower prices for this year, and we are sorry to say that our predictions have been verified. We made more effort to get business this than last year. We believe that the principal reason for this falling off in demand is the rapid increase of facilities in our line, which no reasonable demand can employ, and the rush of concerns who have increased their facilities to get all they can of the demand before the boom was over. This also is the cause of the extremely low prices at the present time; but now comes the tug of war, which will try the strength of all, and push the weak ones to the wall, and thus reduce the facilities to meet the necessary demand, which, in our opinion, will be small for the coming year. Prices will be lower yet, unless combinations and pools are made to keep prices up above what competition will make them. This has already been done in one branch of our supplies, and an advance of 15 per cent. made in the prices; and immediately thereafter it is reported that one of the largest concerns in the pool have reduced the wages of their employes 12½ to 25 per cent. This looks like a transaction to get enough out of the necessities of the consumers and labor to cover the capital of the pool and its unreasonable increase of facilities, and pay a good dividend besides; and when the mill-owners are confronted with a probable reduction of the tariff on their manufactures, they will take shelter behind the poor workmen, and plead for them that no reduction should be made. This is one of the weaknesses of human life; and it is claimed that necessity, makes it, but it is more likely that necessity is the only power that can change it. We have run full-handed up to the present time, but do not think we shall get enough to carry us through the winter, and fear a greater falling off in business; but we are hopeful, and in a position to wait and hope.

Myers Manufacturing Company (Flue Hole Cutters and Vapor Stoves), Chicago, Ill., write us:

The past season has been a very satisfactory one as a whole. The increase of business over the preceding year has been all that could be asked. We started the year with increased facilities, but rapidly outgrew them, and are now having a new building specially put up for us and adapted to our work. We hope to get into the new quarters in about six weeks, and, with double the room and facilities we now have, look forward to a most prosperous year in 1884. The trade seems likely to take the entire product of our factory; and, besides our own goods, we have large outside orders on hand, which are crowding our capacity. We are constantly adding to our line of goods. These goods are now well known to the trade, and rank with the best. We are going into the market this year with several improvements, which will add new value to our stoves. Our flue hole cutters are making their way into the hands of the trade, and giving the most perfect satisfaction, several parties having written that they are doing double the work with them that they did with their old tools. Prices in our line will remain about the same as heretofore.

Warren T. Kellogg, Manager of the Cohoes Iron Foundry & Machine Company, and the Empire Portable Forge Company, Cohoes, N. Y., writes us:

The Cohoes Iron Foundry and Machine Company and the Empire Portable Forge Company business has been of steady and satisfactory growth during 1883. Last Jan. the two companies were consolidated under one management (although the sales are made under their respective names) and the facilities for producing were equally increased, which, however, were scarcely sufficient to keep up with increasing orders. In forges the increase was over 60 per cent., and of all the large number sold, we have yet to hear of one that was not satisfactory. In water wheel governors we have made some radical changes in the patterns, have remodeled the machine, and are now making both, single and double acting. This latter feature has just been added to the long known "Snow" governor, making at once both the simplest and cheapest on the market. The results of these efforts are largely increased sales. Elevators have been one of our pet hobbies, and we have bestowed a great deal of attention upon them, improving the mechanism at every point as fast as points suggest themselves. We probably build more freight elevators for mills than any other manufacturer. We have this year adapted them for steam, water and gas engine power; also designed our patterns for hand power, with anti-friction roller bearings, which we have placed in warehouses, and even private dwellings. Our business in elevators this year has extended from the Atlantic ocean to Mormondom.

Our largest line of machinery, however, is dressing machinery for cotton warps, viz., slashers, warpers and dryers. During the year we have been constantly busy in this line, and to our regular Becker Hot Air Chamber Dryer, we have added the regular cylinder dyeing slashers of various size and capacities. The latest feature is a small cylinder slasher known as the tape machine for dressing pattern work like ginghams, &c. In this line of machines we have been so pressed a part of the time that we were compelled to work nights, and we carry over to the new year contracts for several of them.

In our other specialty, on which we have a national reputation, viz: Leigh's Loose Boss Shell Rolls for spinning machinery, we have been fairly busy all the year, and kept a fair number of hands in that department constantly. The special feature of our shell rolls is their uniformity and perfection. We have the only set of machinery designed by the patentee for making these rolls, that is in the United States, and claim to be the only manufacturers who know *how* to make them, which claim seems to be substantiated by our constant receipt of unsolicited orders.

In view of these facts, we do not seem to have much cause for complaint during the past year, except in the matter of prices, which have been so low as to reduce profits below what they ought to have been. Yet we can produce as cheaply as our competitors and can stand it as long as they can.

On the whole our business has shown a very satisfactory growth during the year, and promises to be still larger during 1884. We have not reduced wages as yet, but I will be surprised if we are not compelled to in the spring.

Clem & Morse (Elevators), Philadelphia, Pa., write us:

While we have been compelled through much competition to sell on very close margins, our trade has generally been very satisfactory during the past year.

As elevators are used in a great many instances by parties who have no knowledge whatever of machinery, they are guided in purchasing more by price than quality, so that in order to sell in competition with those making work of a poorer standard we are compelled to bid low, but we are glad to see an awakening to the fact of how important it is to have only a strictly first-class elevator, and as the merits of our work become more widely known our trade has steadily increased. During the year 1883 we have taken the four-story and cellar building, 411 Cherry street, and altered it so it communicates with each floor of the building we previously occupied, No. 413. Each additional year's use of the Albro-Hindley Screw Gearing only strengthens our convictions as to its superiority over the straight worm for wearing qualities, which was the only thing left to prove, as its superiority in other respects was at once established by the steady motion of car, which it was impossible to obtain with the straight worm. We have furnished the Albro-Hindley screw-gearing during the year for many purposes where the usage was so hard the straight worm would not stand. We have cut some for steering engines, the most recent one being for Williamson Bros., who are making a new steering apparatus for Jay Gould's yacht Atalanta, now undergoing alterations. We are very busy now with orders from all sections of the country consequent upon changes contemplated this month. Our pay roll runs over one thousand dollars per week. Our automatic hatch doors, and pneumatic safety clutch are being applied to most all freight elevators, and the safety clutch to all passenger elevators built by us.

Grant & Bogert (Machine Tools), Flushing, N. Y., write us:

We are now employing about one hundred men, and have all the work we can do; have been obliged to add to our plant during last year the following tools of our own make: One 26″x12′ engine lathe; one 26″x14′ engine lathe; two 14″x8′ engine lathes; one 14″x6′ hand lathe; one 30″x30″x8′ bed, Hewes & Phillips' planer; one 16″x16″x4′ bed, Walters Brothers' planer; one No. 2 Pratt & Whitney milling machine; one 6-ton Pratt & Whitney shop crane; one Stow flexible shaft-drilling apparatus, complete.

We have made the following additions to the line of tools we manufacture: A powerfully geared 16″ engine lathe; a new designed milling machine; a cutter grinding machine; a new mandrel block; and are now working on the patterns for a 20″ upright drill, and have in the draughting room in the works a machine for grooving chill rolls, an axle lathe for locomotive axles,a 6″x6″ engine, and other tools. We have on our books unfilled the following orders: One No. 2 cutting-off lathe; one 16″ swing chucking lathe; six 20″ upright drills; eight No. 2 milling machines; two No. 4 milling machines; one 14″ grinding lathe; one 24″x12′ bed engine lathe; six 16″ engine lathes; one roll grooving machine; besides several special machines, also several of our new mandrel blocks. We are well pleased with the outlook for business for 1884. Prices are about ten per cent. lower than they were a year ago; wages with us remain the same. We are not contemplating any further addition to our plant at present, but may be compelled to do so. We are looking up the subject of electric lighting for our entire works.

J. M. Allen, president of the Hartford Steam Boiler Inspection and Insurance Company, writes us:

The business of this company for the year 1883 thus far has been reasonably prosperous. There are indications of a growing tendency among steam users to secure efficient and intelligent inspection of their boilers. The company has been called upon in many cases by its patrons to lay out new boiler plants. This includes specifications for boilers, settings, piping and chimneys, with full and complete detailed drawings.

This is a growing feature of the company's business, and its success in this direction in economy of fuel has caused its advice to be much sought. The original plans of the company looked forward to the attainment of this result, but it has only been accomplished by long experience in the field and careful study of all the points involved. The outlook for the future is hopeful.

P. S.—In the above letter I say "thus far our business has been reasonably prosperous." I qualify with "thus far," because we never know what a few days may bring forth in a hazardous business. Our losses have been light "thus far."

W. P. Davis (Key-Seating Machines and Drill Presses), North Bloomfield, N. Y., writes us:

Business in machine tools in general is very dull just now. My main business is key-seaters, for which I have a growing demand. Have just shipped a number to the Berry & Place Machine Company, San Francisco, and a car load of key-seaters and other machines to New York City. Have just got out my first lot of new design 20-inch drills, of which E. P. Bullard takes nearly the whole lot. Have in the past year sent machines to New Zealand, Scotland, England and France, and all parts of the United States and Canada. I am so situated that I make all my work, both castings and machine work, by men I hire *by the year;* and, living outside of city influences, can produce better machines for less money than can be done in large cities. Reasonable prices with the use of "printers' ink" have gained me a large sale for my special tools.

Have in the past year added many tools, such as millers, shapers and special tools that enable me to produce more accurate work and in less time; I am, therefore, enabled to produce and give my customers a better tool for the same money. We have a natural gas-well that supplies us with fuel, by which we are enabled to run at all times at a very moderate cost, and as we use an automatic valve we always carry the same pressure on the boiler and require no fireman. This gas is supplied by a company for use as fuel, for boilers as well as for domestic use, and is being used for heating, cooking and lighting, making this section very desirable as a manufacturing point. I do not look for any brisk demand for tools the coming year, but think those who make the best tools for the least money will have a demand for their production.

C. Wing (Hand Lathes and Patterns), Greenfield, Mass, writes us:

Business with me at present is all I could expect or reasonably wish for, with facilities at hand for doing it.

I now have four men at work. Our principal business comes from designing new machines, making patterns and perfecting same, and have an outfit of machine tools for medium and light work. I have plans in progress for building a new shop in the spring, and hope another year to be able to advance my business as opportunity may offer, from which I have been held back in the past, owing to unfavorable location. I am now perfecting a new hand and wood-turning lathe, with improvements from the regular line of manufacture, and shall put it into market soon as I feel that it is practically perfect.

The Curtis Regulator Co. (Pressure Regulators and Steam Traps), Boston, Mass., write us:

Business has been exceedingly good with us the past year, so much so that we have doubled our capacity in room, tools and men, and added a large store room, for the packing and delivery of our goods. We are having a good demand for large regulators, four, five, six inches, even up to twelve inches in diameter, for steam pipes. Are receiving many orders for large regulators from the New York Steam Co. The Davidson Pump Co. has recently ordered a twelve inch regulator for a large pumping engine. The Brooklyn Water Works has a twelve inch in use at the pumping station. We have furnished a six inch recently to the West Shore R. R. Co., to reduce a boiler pressure of 100 lbs. to a pressure of 15 lbs., for running an inclined engine, 48x8 ft. stroke, on a ferry boat on the Weehawken Ferry. We are selling many steam traps to paper, woolen and cotton mills for dryers and starchers, and our regulators and traps are adopted by the Martin Anti-Fire Car Heating Co., of Dunkirk, N. Y., for controlling the heating of trains by steam from the locomotive, thus entirely dispensing with fires in the cars, and preventing the terrible burning accidents, incident to the use of stoves.

The Ferracute Machine Co., Bridgeton, N. J. (Presses, Dies and Fruit Can Tools), write us:

Our business for 1883 has been more satisfactory than for 1882. The orders booked for December exceed those of same period last year by over ten thousand dollars, and our prospects for 1884 are very encouraging. We have lately erected a building containing private offices for our President and Secretary, a well-lighted draughting room and a store room, and have just put in a new 35-horse-power "Straight Line" engine.

In addition to our specialty of presses, dies and other tools for sheet metals, we make contracts for light machinery which it is desirable to improve, cheapen, and manufacture on the duplicate system. Our success in redesigning several machines has kept this department well occupied throughout the year. Among these machines may be mentioned one for beating out and cleaning fiber from aloes and other tropical plants, for use in the West Indies; of these we have already built sixty. A number of soldering machines for square oil cans (invented by Geo. H. Perkins and Oberlin Smith), which perform automatically several operations formerly done by hand, have been built for the Standard Oil Company.

We note some decrease in the price of material, while the prices of labor and productions remain about the same.

James F. Hotchkiss (Mechanical Boiler Cleaners), New York, writes us:

Very satisfactory results I have to report in the manufacture and sale of the Hotchkiss Boiler Cleaner for the year 1883. With a meritorious article and a judicious use of printers' ink, the sales have increased yearly the past six years, when first introduced by me.

Now it is appreciated by the public and adopted as a standard cleaner all over the United States; at the same time South America and Cuba have bought large numbers. Patents have been issued to me in England and Belgium the past year, and work of introduction is being pushed by my representative.

R. A. Belden & Co. (Machine Tools and Drop Forgings), Danbury, Conn., write us:

We are sorry we cannot give a very encouraging report of the present outlook for business, although the past year we have been busy—running full time and full handed—and hope business will start up with the new year.

D. Frisbie & Co. (Friction Pulleys, Hoisters, Couplings, etc.), New Haven, Conn., and Philadelphia, Pa., write us:

We built new works entire at New Haven, Conn., last spring, of about double the capacity of old works. We were busy with orders for friction pulleys, clutches and elevators until about the first of December, when orders fell off, as is usual at that season. We cannot manufacture the clutches and pulleys except to order, and that makes an unsteady business. We are well satisfied with the outlook for 1884. Our customers have been increased, and old ones stand by. Our hoisting engines are finding favor, and we think we shall have a good spring trade.

A. Aller (Specialties for Steam and Water Users), New York, writes us:

The demand for the steam specialties which I control for New York, New Jersey and Connecticut is rapidly increasing, and there has been no indication with me of dull times, but on the contrary I have been overwhelmed with orders. The sales of Korting, injectors and Korting condensers were considerably more in 1883 than in 1882, and the prospects for 1884 bid fair to eclipse all former years.

The Curtis regulator, which I also sell, has gained good favor and sales are increasing greatly. I think that my sales have been very much assisted by judicious advertising in your worthy journal, and also in some others.

S. Ashton Hand (Machinists' Tools), Toughkenamon, Pa., writes us:

The year just closed has been an exceedingly dull and unsatisfactory one.

S. W. Goodyear (Machines for Pointing or Reducing Wire), Waterbury, Conn., writes us:

My business for the year 1883 has been very satisfactory. I have furnished a number of new customers with the wire-pointing machines, while several old customers have shown their continued confidence in the cold swaging process by putting in additional machines. With increased facilities for producing the machines, I purpose making a reduction in price, which will, I trust, add to the sales during the year 1884, and while the general dullness in business has the effect of temporarily withholding orders, the great number of inquiries I am receiving encourages me to expect a good trade.

Wm. Munzer (Steam Engines and Machine Tools), New York, writes us:

My business during the past year has been very satisfactory. I have been full of orders during the entire year and have had to increase my force about one-half, and run the shop to its utmost capacity. I have averaged about two Corliss engines per month, besides a number of Baxter automatic cut-off engines. I have also built a number of 22" lathes, and have had a good run of general business. The outlook for the coming year is very encouraging.

The National Pipe Bending Co. (Feed-Water Heaters and Pipe Bending), New Haven, Conn., write us:

Our business for the last six months of the year 1883 was very good and the outlook for the coming season is very encouraging.

We moved into our new shop on River Street, Feb. 1, 1883, and after getting well started, everything has run satisfactorily and smoothly. Our shop, 140x40 feet, is of brick and two stories high. The first story has a clear floor without posts, and is well lighted on all sides.

We have five iron and brass coiling and bending machines in use, besides the necessary drills, lathes, etc.

We have placed during the year over 150 of the National feed-water heaters, ranging from 10 to 600 horse-power, and every one is giving excellent satisfaction; and besides this, have made over 1,000 car radiator bends and other iron bends. Our orders for December exceeded those of any month during the year, and we have a good supply of orders for January.

The Babcock and Wilcox Co., (Water Tube Steam Boilers), New York, write us:

The general depression in manufacturing throughout the country has been a check upon the business of the company, for, while the amount of power sold in 1883 was greater than ever before, the rate of increase as compared with preceding years, has not been up to the standard. During the past year few new works have been built, and the tendency of old concerns has been to put off ordering as long as possible. One of the worst features of business to-day, is the attempt of would be purchasers to get time on their payments. This being contrary to our rules has, probably, had considerable effect on the volume of business done.

The following table shows the percentage of the total business done by the offices of the company, and is quoted as somewhat of a criterion of the general manufacturing business of the different parts of the country:

New York	34.	Chicago	9.
Boston	7.	New Orleans	6.
Phil. and Baltie	13.	Havana	6.
Pittsburg	12.	Glasgow (Scotland)	13.

Wm. B. Bement & Son, (Machine Tools, Steam Hammers &c.) Philadelphia, Pa., write us:

We are now working rather more than eighty per cent. of our maximum force; running ten hours a day. During the latter half of 1883, our orders were slightly in excess of those of the previous six months, and only three per cent. below those of the latter six months of 1882. We have all along held the opinion that the present year would be one of less prosperity for the tool business than the last, and the numerous important inquiries which have reached us this month, due mainly, we think, to the usual postponement beyond the time of annual settlement, do not modify our views. It is well to be hopeful, but safer to have moderate expectations. If we should do as well in 1884 as in 1883, we shall be most agreeably surprised.

The Lidgerwood Manufacturing Company, 96 Liberty street, New York, write us:

We have had a very good business indeed for the past year, but during the last two months of 1883 there was a falling off in Western business. Indications are that there will be a revival of business in the slack points directly. The tendency is to extreme caution in making sales.

The American Saw Company, Trenton, N. J., write us:

The year just closed (1883) has been a very satisfactory one to us, in every way. Our specialty, of inserted-tooth saws, seem to meet the wants of mill men, and our orders have been greater than any previous year; the "Trenton tooth" saw in particular seeming to give general satisfaction in the yellow pine and hard-wood districts. We anticipate a very good trade this spring; our present orders are in excess of same date in past years. We have added to our wrench product the new one known as the "Falcon," which, when as well known as the "Alligator," we believe will give us about all we desire to do in that line. The alligator wrench is a decided success, and we presume we owe a portion of the demand to the columns of your very superior paper.

The L. B. Flanders Machine Works (Special Tools for Railway Repair Shops), Phila., Pa., write us:

The past year, while not as satisfactory as 1882 as a whole, has brought us good returns. We have been kept busy. Have retained all our old hands, and added a few new shop tools to facilitate our work. No changes have been made in prices of material, labor and production.

We have added to our list of special tools, for railway repair shops, a patent portable wrist-pin lathe, a patent portable chuck for planing valves to be used in connection with our patent portable valve seat rotary planing machine, a patent flue cleaner for outside deposits, and a patent drilling machine for drilling boilers and other cylindrical objects from the interior of same.

The prospects for 1884 are good. Have quite a number of orders on hand for our railway specialties, and many inquiries are coming in daily.

The Akron Iron Company (Bar and Pig Iron and Patent Hot Polished Shafting), Akron, O., write us:

Trade for 1883 in our line did not nearly come up to our expectations, but, under the circumstances, we have no great cause of complaint. Our trade in common bar iron is confined almost exclusively to the agricultural implement trade, which suffered during the fall season both from over production, and from the failure of the wheat crop in the winter wheat states. Consequently manufacturers in that line have been running slow up to January 1st, but from now till July 1st next we look for an increased demand in that line, in fact orders from this source are now coming in rapidly.

Our trade in hot polished shafting was all that could be expected, and notwithstanding the depression in other branches of the iron trade, we are having enough orders to keep us fairly busy, and the outlook is that we shall continue in that condition.

If Congress will let us alone, and not tinker in tariff matters, we will look for a fairly good year, although it might be the proverbial presidential year, but with that highly intelligent body of "Smart Alecks" in session, with a free-trade speaker, and ways and means committee, I do not know that manufacturers as a body can expect very much but an agitation that will unsettle trade and intensify the present depressed condition of things.

The Nicholson File Co., Providence, R. I. write us:

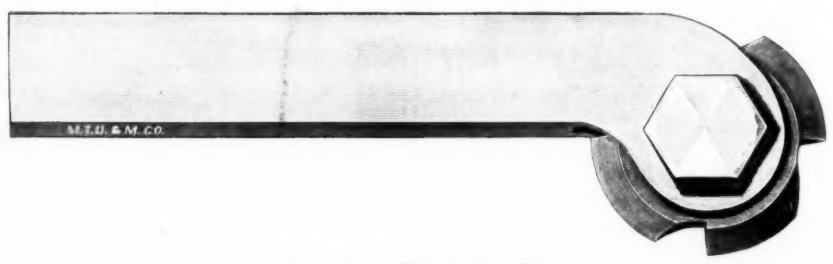
Our past year's business has been fairly good in quantity of goods sold, but prices have ruled very low, and we see but little prospect of any improvement in the immediate future, either regarding prices or volume of business. The crops are good as a rule; the stocks of general hardware in the hands of dealers are not heavy, and the main thing lacking appears to be *confidence*, and this, Mr. Editor, will not be obtained while a tinkering of the tariff is *in process* or only *contemplated*.

It affords us pleasure to announce, that with the extensive additions to our buildings and fine machinery, during the past year, we are now enabled to produce the very small and fine files, which, up to this time, have been imported from Switzerland and Warrington, England.

Having now a stock (in addition to our regular goods) of upward of six hundred different varieties, which we are daily increasing, we think we are justified in saying that it is not necessary for the fine toolmakers, watchmakers or jewelers to go abroad, hereafter, for their supply of this class of very small and fine files.

The Norwalk Iron Works Company (Steam Pumps, Air Compressors, &c.), South Norwalk, Conn., write us:

Business was somewhat depressed during the fall, but has since been steadily improving. Present outlook encouraging.



A Convenient Threading Tool.

T. R. Almond (Chucks and the Almond Shaft Coupling), Brooklyn, N. Y., writes us:

My chuck business during the past six months has been better than at any former period. My coupling business is now beginning to prove itself a success, as I am receiving orders from many parts of the country. I am pleased to state that those which I have sold are giving good satisfaction. I have recently sent one to Rio Janeiro, also several to England. I expect soon to be able to give more complete data relating to this means of transmitting power at an angle."

A. M. Powell & Co. (Machine Tools), Worcester, Mass., write us:

With regard to business we can say that our capacity has been constantly increasing during the past year, and we have kept our full force at work. Indeed we have been quite busy for the last three months on regular goods, and also on some specialities, like large shafting turning, and emery wheel lathes, and althongh our orders are now small, we look confidently for a fair share of business during the coming year.

Warner & Swasey (Machine Tools and Special Machinery), Cleveland, O., write us:

We have, during the year, increased our facilities 25 per cent., and are running full time and full force. Have added several new machines to our list of standard machine tools. Orders are not so urgent as a year ago, but trade seems healthy and the prospect ahead good.

Hilles & Jones (Machinists' and Boiler Makers' Tools), Wilmington, Del., write us:

Our business for the past year has been fair, and if we had not had our increased facilities for getting out our machines quickly, such as punches, shears, bending rolls, and other heavy machines, and boiler makers' tools, we should have considered ourselves busy.

The year's business has been satisfactory, and we are expecting a continuance of trade during this year, 1884.

A Convenient Threading Tool.

The Morse Twist Drill and Machine Co., New Bedford, Mass., write us:

We have added to our line of machinists' tools several new and very desirable ones, viz: Bit stock countersinks, adjustable counterbores, hardened steel mandrels, fitting holes reamed by reamers of our make, rose shell reamers, arbors for shell reamers and a lathe threading tool. The holder of the threading tool is slotted, forming jaws between which the circular cutter is firmly held by a bolt passing through the jaws and the cutter. The cutters are furnished to the V, or U. S. standard thread singly or in sets as desired. They are readily removed from the holder. The roughing cut for a thread may be taken with one section of the cutter, and the finishing cut with another if desired, the cutter being revolved in the holder, which need not be removed from the tool-post of the lathe. The cutters are quickly sharpened by grinding the face. They are 2" in diameter, and there is 4¾" thread-cutting surface to each. The holder is made so that the cutting edge stands on the proper angle for all the standard number of V threads, ¼" to 1½": for regular V threads it requires but one cutter for sizes ¼" to 1½": for U. S. S. thread it is necesaary to have a cutter for each number of thread. This tool is particularly well adapted for the production of this system of threads, as each cutter in a set will be made to conform to the Standard gauges, both as to the angle and the flat of the base of thread. All the above tools are well made and finished.

Our business for the past year has been very satisfactory, and with our increased facilities we are now prepared to fill promptly any orders for goods in our line.

Years ago, steamboats on the Mississippi River carried only one light, and that a tallow candle flickering in a tin lantern suspended under the forward main deck. In these days the Rocky Mountain once lit out from New Orleans in the evening ahead of about twenty steamers. Every one of these soon passed the Rocky Mountain, and presently the captain missed the signal light in its proper place, and irately rushed at the watchman, and profanely inquired the meaning of the signal light being absent. "Where is the light?" asked the skipper. "Over the stern," replied the watchman; "the pilot thought there was greatest danger of a collision on that end."—*Marine Journal.*

One marked difference between machine tool business in this country and in England is that there machine tools are quite generally furnished on the specifications of the buyers—something that is rarely done here. The plan adopted there may give the individual buyer more nearly what he thinks he wants, but it may be questioned if it has a tendency to improve the quality of tools. The manufacturer in this country may be depended upon to improve the quality of his product to secure sales against universal competition, and his experience and observation being constantly in that direction, he is naturally sharp to forsee and adopt improvements. Certainly he should be able to manufacture more cheaply, throngh greater use of special tools and conveniences, and more uniformity of shop practice. There hardly seems, in this country, whatever there may be in England, much occasion for the buyers of machine tools, to do much in the way of designing them, since amongst the multitude of builders, something is generally found to suit both in price and quality. Generally speaking the builder knows better how to build a good machine tool than the buyer. This is even more universally true of the manufacturers of steam engines in this country. Buyers here have but little intention of teaching manufacturers how to build, and builders as little inclination to be taught. The responsibility rests where it belongs, with the builder, and this seems to have a tendency to improve the quality of the work done. When a purchaser is not satisfied with the product of one manufacturer, he can generally contrive to suit himself with that of another, while manufacturers watch closely the character of the demand, and govern themselves as to quality of product by what that may be from time to time.

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NEW YORK, JANUARY 26, 1884.

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The Main Industrial Apprehension.

This week we again present a collection of letters from machinery establishments, noting the condition of business and prospects for the future. Most of the writers of letters appearing in this issue, as well as of those in last preceding issue, have experienced a fair trade during 1883, and are hopeful of the future. The only serious apprehensions of poor business progress expressed in any of these letters (nearly a hundred in all) have reference to the effects of adverse tariff legislation by Congress. If our legislative Solons, at Washington, would take pains to inform themselves of the business views (independent of political parties) of the men carrying on the productive and distributive industries of the country, they would discover (if they care to do so) the strength of the sentiment opposed to further tariff tinkering. All business is suffering from the threats of falsely named "Tariff Reform." Reform with these assailants of our national industrial policy, means *reduction* every time the word is used in connection with the tariff. It best serves their purpose to use the word "Reform" (with a big capital R) to gain the sympathies of the masses of people, for nobody opposes genuine reforms. Thus an alluring mask is used to partially disguise the tendency of their efforts, while protection to American industries is being torn away. We trust, however, that Congress will after all take the common sense view, and leave the tariff undisturbed.

Need of Technical Schools for Mechanics.

Within the last quarter of a century, this country has come to the front as a manufacturing nation. Twenty-five years ago our native artisans were equal to their compeers in any part of the world for their technical knowledge of the subjects relating to their work. To-day our rising workmen are behind those of any other leading nation in technical knowledge. In all things, the individual or the nation that ceases to advance is retrograding, for others do not stand still. Our workmen are falling behind, because other nations have extended and improved their educational systems so that their workmen should receive training bearing directly on their industrial occupations, while we have been contented to move on in the old channel, leaving the school instruction of our mechanics to the mercy of a system which recognizes the intellectual needs of lawyers, clergymen, and merchants, but ignores industrial pursuits. Instead of bringing the school and the workshop into closer relationship, the extension of our manufacturing pursuits has had the effect of widening the distance between them. Twenty-five years ago, the boys engaged in learning trades usually spent part of the year in the school and part in the workshop. By this means they readily came to apply what was learned in the school to calculations in the shop. The rule of proportion which taught them the relative prices of small and large quantities of groceries, was also seen to be applicable to calculating the relative speed of pulleys. The rules which instructed them how to find the area of a circle were naturally applied to finding the area of a piston-head. By the present system, the entry of a boy into the workshop divorces him from the school. By the time he reaches the point in learning the trade where the philosophy of the business becomes a matter of interest, the small part of the school learning which he could have applied, when it was fresh in his memory, is forgotten. We need some means of keeping the school education of young mechanics fresh in their memory till they learn to apply it to their work; and we need reforms in school training, so that its instruction may be made more directly applicable to industrial pursuits.

For years past a great awakening has been going on in the industrial countries of Europe regarding the educational needs of artizans. The operation of commercial competition showed the rulers that a knowledge of technical process among workmen tended to increase production. And each nation has gone systematically to work to develop this weapon of peaceful warfare. The most successful way of carrying out plans of technological instruction has been that of opening evening classes, providing competent teachers, and encouraging the young workmen to interest themselves in the classes.

America has done almost nothing in this direction. In some States there are technological institutions where valuable instruction is imparted to students, but the great need of the country is instruction which will reach the rising workmen. Upon their training and ability our progress in the race of competition to a great extent depends. We know of cases where young mechanics and apprentices have originated and borne the expense of evening classes, and their struggles to help themselves were seriously impaired through want of competent teachers. Self-reliance is a commendable national characteristic of our citizens; but the State which leaves the mental welfare of its rising generation to be cared for entirely by private personal enterprise is neglecting its best material interests.

Trade With the Argentine Republic.

In these times, when our merchants are on the lookout for foreign markets, to dispose of our surplus manufactures, trade generally reaps the benefit of having trustworthy information regarding the needs of foreign countries. Several of the United States consuls abroad are doing good service in this direction. Foremost among the consuls who have compiled useful reports about the States they are located in is E. L. Baker, of the Argentine Republic. In a recent report, covering over thirty pages of printed matter, Mr. Baker gives a most exhaustive review of the condition and needs of the country. In regard to increasing the American trade with the Argentine Republic, he thinks there is urgent need for close and regular steam communication between the two countries, which at present is very unsatisfactory. He also says that improvement is wanted in a system of trade credits, and in the methods of carrying on business. Many complaints are made that American houses do not keep good faith with agents, who spend time and money advertising their goods, and that many shippers are so careless with packing that merchandise is often destroyed in transit.

A Pennsylvania man writes to ask us whether we know of any person or persons in the State of Vermont who are raising minks, and where beavers can be bought. We don't know about minks or beavers, but have heard of a person or a gang in Maine who are raising wolves as a regular industry, in order to get the State bounty on their scalps. We suggest to our anxious inquirer that he send his question to some scientific newspaper that has an animal department.

A Simple Matter that Perplexed Eminent Engineers.

General Hutchinson, the British Railway Government Inspector, who was present at the opening of the Northern Pacific Railroad, was greatly puzzled over the way they use the air-brakes to control trains on long mountain grades. When a train is descending a very long grade, it is customary to use straight air, because the pressure can be kept up by direct connection with the air reservoir—that is, the brake is rendered merely atmospheric. Where the automatic connections are on, the auxiliary reservoirs cannot be charged with a fresh supply of air without letting off the brake, which is not a desirable act when a train is descending a grade of 200 feet to the mile. Gen. Hutchinson was informed that straight air was used on mountain grades, but he could not understand the expression, and he could not comprehend why the automatic brake was not maintained in service. He conveyed his perplexity to the Institution of Civil Engineers, and none of that distinguished society's members could throw light upon the subject. The same matter confounded Mr. Brace, an eminent English engineer, who was a member of the excursion party.

The *Railroad Gazette* has information of the laying of 6,130 miles of track in 1883, and the *Railway Age* finds 6,608 miles constructed during the year. Until the corrected returns are made out we shall content ourselves by splitting the difference and calling it 6,369 miles of new railroad built in 1883.

The newspapers report more Christmas presents this winter from employers to workmen and from workmen to foremen and superintendents than ever before. In no other country in the world are the relations between employers and employed as uniformly pleasant as in the United States. Nor is there any other country in which both proprietors and workmen are as jealous of their well known rights. Strikes often occur, but it is seldom that one of them is virulent.

Dictating to Customers.

Complaint is made in the consular reports, from some of the South American States, that our manufacturers are losing trade there by not making implements to suit the tastes of the purchasers. Attempts to make purchasers of goods accommodate their wishes to the tastes of the makers do not generally succeed. An attempt of this kind lost the Sheffield hardware makers the business of supplying the American market with axes. The English chopping ax is flat, and Sheffield makers persisted in sending that form of tool, when axes were ordered from America, although the purchasers requested the oval wedge-shaped article, so much favored by our choppers. The blind obstinacy of the English hardware men provided the means of giving our ax makers a good start in their business. When farmers and wood choppers in Brazil ask for a plow or an ax of a particular shape, our makers should not attempt to teach them their business, as seen from an American standpoint, but give them what they want, or the manufacturers in other countries will get the trade.

Several years ago, when promiscuous abuse of railroad companies was the fashion, some of the Southern States passed laws which practically took away from the railroad companies the management of their property. Politicians, whose railroad experience consisted principally in traveling in palace cars with free passes, were put in charge of the management of railroads, and in some cases they received autocratic powers in the control of railroads which made their word law. This has not worked well. Its effect has been to prostrate railroad building wherever politicians were put in charge. This interfered with general business, and caused the growth of an agitation to have the railroad laws repealed. The South Carolina Legislature has now come out and repealed the obnoxious laws, and the indications are that Georgia will soon follow.

Literary Notes.

One of the neatest looking trade newspapers that comes to our desk is the *Journal of Progress and Wood Workers Magazine*, of Philadelphia, the January issue of which is the third number published. It is a 32-page magazine, devoted to the interests of wood workers. The subscription is $1.00 a year until Feb. 1; after that date $2.00.

The *Sewing Machine News* of New York City is presenting a useful book free to all subscribers for 1884. The volume is entitled "Hints on Repairing and Adjusting the Various Kinds of Sewing Machines." The subscription price is $1 a year.

The *American Bookseller* is the leading publication of its kind in the world. It gives in compact space all that the book dealer or buyer will care to know or will find useful. It is issued semi-monthly by

the American News Company, New York, at $2.50 a year, which is the new subscription price, taking effect from Jan. 1, 1884.

Dr. Rossiter W. Raymond has been selected for the position of secretary of the American Institute of Mining Engineers in place of T. M. Drown resigned. His address is Lock Box 223, New York City.

The annual meeting will be held in Cincinnati, O., beginning Tuesday evening, February 19th, 1884. Mr. L. E. Warner, Cincinnati, O., is chairman of the local committee of arrangements. A circular will be hereafter issued giving the details of the meeting.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(31) H. F. H., Brooklyn, N. Y., asks: What will be the difference in temperature between steam of 100 pounds pressure and the water in the boiler? *A.*—Under ordinary circumstances there will be no difference.

(32) R. K., Montreal, Canada, writes: I am working on a new planer, of which the bed and table were planed quite true. The bed was placed in the shop and properly leveled up, and the table properly bedded. When put in its place to be run, there was considerable rock in the table. What causes the rocking, and how can it be remedied? *A.*—The rocking is evidence of poor fitting or poor setting, which we cannot tell, and hence cannot indicate the remedy.

(33) A. J. K., Newark, N. J., asks: How are the main driving wheels of a locomotive revolved while the valves are being set? *A.*—In many shops permanent rollers are fastened on the track level with the top of the rail. The engine is stopped with the main drivers resting on the rollers, the side rods are taken down, and the rollers turned by a lever, and they cause the wheels to revolve. Another plan is that of movable rollers, which are secured fore and aft the drivers, and are drawn under the wheel by screws. With this method the weight of the engine is carried on screw jacks. In the absence of special apparatus for turning the wheels, a familiar way of doing it is to pinch the engine along the track. In setting the valves for forward motion, the wheels are turned forward; for back motion, they are turned backward.

(34) V., New Britain, Conn., asks several questions about the horse-power of a 6″x10″ engine at various pressures of steam and piston speed; also: 1. How can I find out how to answer such questions for myself? *A.*—The only way to find the horse-power of the engine is by a dynamometer, or by applying an indicator to the cylinder and finding what the pressure is there. No one can tell how much of the boiler pressure is realized in the cylinder. Knowing what the mean effective pressure in the cylinder is, the indicated horse-power is found by multiplying the area of the piston, in square inches, by this pressure, and by the piston speed in feet per minute, and dividing the product by 33,000. 2. How much more water will pass through a 1″ pipe than through a ½″ pipe, the pressure being equal? *A.*—The area of a 1″ pipe is four times that of a ½″ pipe, and the friction is proportionately less in the large pipe. The large pipe will pass more than four times as much water as the small one—exactly how much more than four times as much depends upon a great variety of circumstances.

(35) D. E. S., Philadelphia, Pa., writes: 1. I am putting up a fan that is to make from 2,100 to 2,800 revolutions per minute. The arrangement of pulleys is: 24″ on line shaft to 13″ on countershaft; then 28″ on countershaft to 7″ on fan. The main shaft makes 310 revolutions per minute. Now I contend that the largest pulley should be on the line shaft. Am I right? *A.*—Generally speaking, you are right. It would be easier on the first belt if the pulley on line shaft and the first pulley on countershaft were each larger. 2. The engine is being speeded up from 80 to 100 revolutions per minute. What will be the difference in horse-power? *A.*—If conditions are favorable, it should increase the capacity not less than twenty per cent. 3. We are obliged to carry 80 pounds of steam to run to speed, and the boilers are scarcely able to make steam. What will be the effect of increasing the speed of engine? *A.*—If the power used is increased proportionately with the speed, more steam will be required, and the boilers will require extra crowding. 4. Is it proper to use tubular boilers in a mill where coal is used as fuel in the morning and shavings in the afternoon? *A.*—Yes, with tubes of large diameter.

(36) Z., Iron Mountain, Mo., writes: Can you give me a rule for forging and tempering mill picks? also taps and dies? *A.*—In forging, the heating should be done very evenly, in a clean fire, avoiding too high a heat. Mill picks are usually hardened without drawing the temper. Sometimes they are heated, for tempering, in a lead bath, which we believe to be a good plan. The lead should be heated to a red heat, the intensity of which must be judged of by experience. After heating in this bath, cool in pure water without drawing the temper. When only an occasional tap or die are to be made, they can be hardened from a good clean fire, and the temper slowly drawn to a yellow, bordering on purple.

(37) J. P., Williamsburg, Ohio, writes: We have been using a polishing wheel made of wood, but fail to get the emery to stick, although we use the best of glue. Can you help us? *A.*—The wheel should be covered with leather 3-16″ to ¼″ thick. Put the leather on in one piece, the flesh side next the wood, the joint scarfed bluntly, that is, so that the length of the scarf is but little more than twice the thickness of the leather. The leather should be glued to the wheel, and bound securely till dry. A row of wooden pegs may be used at the joint of the leather, and a few all over the surface will do no harm. These pegs should be cut off below the surface of the leather. In covering the leather with emery, only attempt about 10″ of the circumference at a time. Do this by applying the hot glue and then the emery as quickly as possible, pressing the emery into the leather with a strip of smooth board. If your wheel is properly laid up, so as not to warp, and covered in this way, you should have no trouble.

BUSINESS SPECIALS

Transient Advertisements, 50 cts. a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Special Machinery—G. D. Lambert, New Haven, Ct.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N.J.

James W. See, Consulting Engineer, Hamilton, O.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

F. VanWinkle, Mech. Engin'r, 22 Cortlandt St., N. Y.

Spanish translations of catalogues, circulars, &c. J. M. Da Rosa, 260 East 3d St., Cincinnati, O.

Steam launches, marine and stationary engines, single and compound. M. J. Sanderson, Syracuse, N.Y

"Tack Machinery"
Willets Manufacturing Co., Providence, R. I.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Wood Engraving done in best manner. Designs furnished. Edward Sears, 48 Beekman St. New York

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Patents.—Franck D. Johns, Att'y at Law & Solicitor of Patents, 617 Seventh St., Washington, D. C.

Pattern and Brand Letters. Vanderburgh Wells, & Co., corner Fulton and Dutch streets, New York.

Consulting Engineer and Mechanical expert, C. C. Hill, 144 LaSalle street, Chicago, Ill.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Herbert W. T. Jenner, Mechanical Engineer and Solicitor of Patents, 626 E st., Washington, D. C.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Jack pump and ladder chain machines, 40 to 80 links per minute, direct from coil. The Gaylord, Cross & Speirs Company, Waterbury, Conn.

The "Wax Process" engravings shown in the AMERICAN MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

New Books, relating to steam, the steam engine, mechanics, machinery, and engineering. Send for catalogue. Fred. Keppy, publisher, Bridgeport, Conn.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

H. O. Reinhardt, M. E., Mem. Am. Soc. Mining Eng., Chihuahua, Mex., invites correspondence of man'frs of machinery desiring to introduce same in Mexico.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

"Recent Locomotives."
Specifications and large-scale engravings, with details, of 70 present types of locomotives, $5. For sale by the Railroad Gazette, 73 Broadway, New York.

BOUND VOLUMES of the AMERICAN MACHINIST for 1880. A limited number for sale at $3.50 per volume, express charges to be paid by purchaser. $4.50 per volume will be charged for 1881 and 1882. AMERICAN MACH. PUB. CO., 96 Fulton st., New York.

"HOW TO KEEP BOILERS CLEAN."—A book of seventy-two pages, telling how to prevent scaling, foaming, priming, and burning, with other valuable information, will be sent to any address FREE of postage, by James F. Hotchkiss, 86 John street, New York.

Any of our readers who have complete files of Volumes I. and II. in good condition, bound or unbound, can probably find a purchaser by addressing us, and stating the lowest price they will accept. AMERICAN MACHINIST PUBLISHING COMPANY, 96 Fulton street, New York.

EXTRACTS FROM CHORDAL'S LETTERS, containing nearly 400 pages, 12mo, handsomely bound in cloth. New and enlarged edition, with additional illustrations, many of them humorous and all effective—over 50 in all. Just the thing for a holiday or birthday gift. Price $2. Published by John Wiley & Sons, 15 Astor place, New York.

Patent "Common Sense" Binder for the AMERICAN MACHINIST holds 52 weekly issues in good shape. Sent to any address, in the United States, by mail for one dollar. To Canada and foreign countries 75c., the purchaser to pay custom-house duties and express charges. American Machinist Publishing Co., 96 Fulton street, New York.

Since October 4 *The Sanitary Engineer* has been published every Thursday in London, the date of issue there being two weeks later than the date in New York. The American issue complete, advertising pages as well as reading matter, is sent over each week in sheets. These are folded and bound in London, with an attractive colored cover, on which appear advertisements intended for the British and Continental readers of the paper. The publishers guarantee for the next year a larger English circulation, among the same classes as read it in the United States, than is now enjoyed by any English publication of a similar character. These include architects, clubs, chemists, civil and sanitary and mechanical engineers, gas and water companies, builders, contractors, manufacturers of food products, pharmacists, electricians and manufacturers of electric lighting apparatus, etc., health officers, physicians, plumbers, manufacturers and dealers in water, gas, steam and plumbers' supplies, officers of public institutions, managers of large corporations, libraries, reading-rooms, and intelligent householders generally.

The Sanitary Engineer, conducted by Henry C. Meyer, is published every Thursday at 140 William Street, New York, and 92 and 93 Fleet Street, London.

Subscription, U. S. and Canada, $4 per year, post paid. Foreign, $5. Single copies, ten cents, from all newsdealers. Specimen copies free, if this advertisement is referred to.

MANUFACTURES.

Among the building permits granted in Brooklyn during 1883 were 102 for shops and 46 for factories.

Paul Wiedman, 97 North Third Street, Brooklyn, N. Y., will erect a four-story brick factory, 51x122 feet, at a cost of $8,000.

Geo. A. Schastey & Co., furniture manufacturers, 228 West Fifty-third Street, New York, will erect a six-story factory, 30x98 feet.

The Advance Threshing Machine Works of Battle Creek, Mich., which built fifty machines last year, expect to turn out 200 in 1884.

It is stated that the Pottstown, Pa., Iron Company contemplates erecting a large universal plate and shape mill on its grounds.

The Baldwin Locomotive Works at Philadelphia are constructing a number of consolidation freight locomotives for the West Shore Road.

The Springfield *Republican* says: Consolidation and enlargement seems to be the rule just now among whip manufacturers.

Business is dull at the Fairbanks Scale Works, in St. Johnsbury, Vt., and the pay-roll is said to have dropped from $27,000 to $17,000 in the last month.

In celebration of Christmas, the Medart Pulley Company, of St. Louis, gave a dinner to their ninety employes, and made the event one of great pleasure.

The L. B. Flanders Machine Works, Philadelphia, have issued a very neat lithographic calendar for 1884, which they are mailing to their customers and friends.

The American Watch Company, at Waltham, Mass., will require 3,500 employes to produce 1,800 watches per day, this number to be made as soon as possible.

The Holyoke, Mass., paper mills are all running full time, and the amount of paper being produced is larger than it was a year ago. The outlook for business is reported promising.

Rochester, N. Y., is bidding for the West Shore Road's shops for the Buffalo division. The *Union* says that a tract of fifty acres of land has already been bought.

The arrangements have now all been completed and contracts signed for the erection of the tin-plate manufactory at Hubbard, O., by Messrs. Hutchings & Trick.

The Norway Iron Works at South Boston have been sold for $150,000. The name of the company will be changed to the Norway Steel and Iron Works.

Jno. Williams, Quincy, Ill., says the *Age of Steel*, has completed new works for the manufacture of stove rods or bolts in that city on an extensive scale, and has already received a single order for 20,000 bolts.

The Scaife Foundry and Machine Company, limited, is the name of the new corporation running the Monongahela Foundry and Machine Works, Pittsburgh, Pa. Wm. Lucien Scaife is chairman, and Marion F. Scaife, secretary and treasurer.

Ground has been purchased at Chattanooga, Tenn., for a new furnace, having a capacity of one hundred tons a day. It is said that Mr. J. Lane, of Athens, and Senator Joseph E. Brown are interested in it.

The Putnam Tool Company, Fitchburg, Mass., are increasing their capacity as fast as they can, by putting in some tools from other builders, and holding what they can of their own make from orders, which will last them three months the best they can do.

Kendall & Roberts, Cambridgeport, Mass., are running their shop nine hours a day, with no reduction of wages of apprentices. A recent item in this column left the impression that the journeymen were also paid the same as for ten hours, which is not the case.

The main shaft in the new Pullman freight car shops at Pullman, Ill., was started on December 21, and it is expected that the entire works will be in operation within two weeks from that date. When in full operation, the shops will have a capacity of twenty cars a day.—*Railway Age.*

The M. T. Davidson Steam Pump Company, Brooklyn, N. Y., have issued a new illustrated catalogue of their improved steam pumps, pumping engines and hydraulic machinery. It is well gotten up, and explains the construction and operation of the pumps in a satisfactory manner.

The Empire Portable Forge Company, Cohoes, N. Y., have issued a new illustrated pocket catalogue and price list of their portable forges, of which they make a large variety. They publish on one page of the cover a telegraphic code, to be used in ordering forges or parts of forges. This code is for convenience and economy.

The Pulsometer Engineering Company, limited, London, England, have issued an illustrated catalogue of Deane steam pumps and pumping engines, which they have acquired the sole license to manufacture in that country; and they declare in the preface that they "believe it to be the best machine of its class in the market." The catalogue is printed in the American style, in Glasgow, and is much superior to the ordinary style of English book print.

The town of Moline, Ill., is just about to start its new water works. The pumping machinery, having a capacity of a million and a half gallons per twenty-four hours, was supplied by the Deane Steam Pump Company, of Holyoke, Mass. It consists of one compound condensing pump for the lower part of the town, and a smaller compound pump for the "cliff."

James H. Lancaster, of New York City, has purchased the works of J. H. Darlington, in Harlem Railroad building, on Center street, where he intends to build his new caloric pumping engines and caloric motors of a quarter, a third, and a half-horse power. He will also build all the machines that Darlington formerly did. The new concern will be the J. H. Lancaster Engineering Company, and will employ about fifty men.

The firm of Nathan & Dreyfus, office 92 and 94 Liberty Street, New York, has been merged into a joint stock corporation entitled the Nathan Manufacturing Company. The business of manufacturing and selling injectors heretofore carried on by the firm will be continued by the new company at the same location, its officers being Max Nathan, president; Wm. Toothe, vice-president; Jacob W. Mack, secretary and treasurer; and Chas. Judge, assistant secretary.

P. Hayden & Son, of Columbus, O., who have had their malleable iron made at the penitentiary, have awarded the contract to Elfil Gilliman & Co., of this city. They paid their moulders $1.90 per 100 moulds, which caused a strike. The moulders demanded $2.25 per 100 moulds, and were called to work. The firm wanted the moulders to stand good for the broken patterns, which caused another strike, and the moulders were again victorious.—*Cleveland Star.*

The striking moulders in March, Brownback & Co.'s foundry, Limerick, Pa., have accepted the reduction and returned to work.

The Cedar Rapids *Republican*, in a review of last year's business in Cedar Rapids, makes a most encouraging showing for that enterprising city. Within a year, seventeen additions have been plotted on to the city, and numerous new buildings have been erected to accommodate an increase of population of 5,000—a most encouraging increase in one year. Cedar Rapids has become an important railroad center, being the distributing point for a wide northwestern territory that is in course of development.

The manufacturing business of Western Massachusetts presents upon the whole a favorable outlook with the beginning of the new year. While certain establishments are doing as well as a year ago, if not better, the universal testimony goes to show that trade in general is considerably less brisk than it was then. This falling off is accounted for in several ways. Some charge it to past and prospective tinkering of the tariff. Many say it is due to an over-supply of goods. Others claim that business men are becoming more conservative, while those who have been trading on borrowed capital are being thinned out, so that the prospect is really more encouraging than if all kinds of business were rushing. A fourth class maintain that the depression is due to the fact that people are becoming more economical.—*Boston Commercial Bulletin.*

The *National Labor Tribune* of January 5th says: "The nail mills in the Pittsburgh district, with one exception, were closed on Saturday in accordance with the orders of the Western Nail Association. The suspension will probably continue six weeks. In the Western district, which extends from Pittsburgh to Omaha, there are thirty-three mills. About 5,000 men are employed in all. Some of the manufacturers who are opposed to shutting down say the stocks in the hands of dealers are low and ill-assorted, and that the suspension was unnecessary. The Jefferson Nail Works at Steubenville, and the new nail mill at Brilliant, Ohio, disobeyed the orders of the association, and will continue to run. All the others in the district, it is said, have suspended. It does not follow that the shutting-down of the nail factories carries with it the stopping of the puddle departments of those mills. Undoubtedly some of the puddle mills will be closed, but not all."

Machinists' Supplies and Iron.

NEW YORK, January 10, 1884.

The supply business, compared with the same business during the flush times, would undoubtedly be considered dull, yet the volume of business done is by no means insignificant. Prices are low, and profits not what they were a year ago; but the feeling is general that the lowest point is reached, and that any change will be for the better.

Manufacturers of machinists' and engineers' supplies generally concede that profits are small, but are hopeful of the future. Some have decreased the number of workmen employed, but reports of the wholesale discharging of employes are entirely sensational.

In the iron and steel industries the starting-up of mills that it was supposed would remain idle till spring, many of them with orders for some months, has a favorable influence.

In American pig iron transactions are light, with no radical change in prices. There is no surplus to influence the market, and any important change is not probable. We quote No. 1 X Foundry, $20 to $20 50 for standard brands, though some brands are held $1 higher; No. 2 X, $19 to $19 50.

In Scotch pig we quote Coltness, $22.50 to $24; Glengarnock, $21.50; Gartsherrie, $23; Summerlee, $22.50; Eglinton, $20 to $20.50

Lead has advanced in value, being held at 4.25 for common, which buyers are not willing to concede.

Antimony—Hallett's, 9¾c. to 10c.; Cookson's, 11c.

Copper is quoted at—Lake, 14¾c. to 15c.; other brands, 14c. to 14½c.

Spelter is in light demand at—Refined, 8c. to 8¼c.

✲WANTED✲

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

First-class mechanical draughtsman desires engagement. Address E. H., care AM. MACHINIST.

Experienced draughtsman is open for engagement. Address J. H., care AM. MACHINIST.

A mechanical draughtsman, who has good references, wishes to correspond with reference to an engagement. Address A. W. C., AM. MACHINIST.

Wanted—Situation as foreman in a machine shop; eleven years' experience. Address E. N. 85 Oliver Street, Toledo, Ohio.

Wanted—A good moulder on small and medium engines. Address K., AMER. MACHINIST, with age, references, and wages expected.

Young man wants situation. Has had experience in designing, draughting, constructing and erecting machinery; also in management of men. A. Blauvelt, 358 Clinton Street, Brooklyn, N. Y.

Wanted—A foreman machinist; one competent to design, construct and erect machinery. None but those thoroughly capable need apply. Address P. O. Box 1358, New York City.

A good draughtsman, of ten years' experience on locomotive work and general machinery, is open for an engagement. Experienced in shop. First-class references. Address Valve, AM. MACHINIST.

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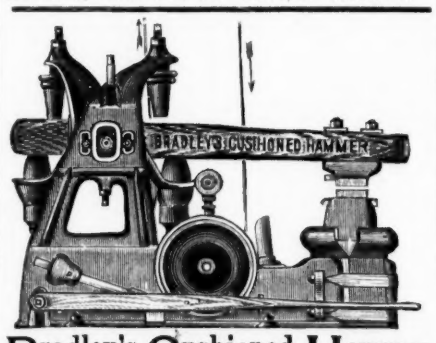

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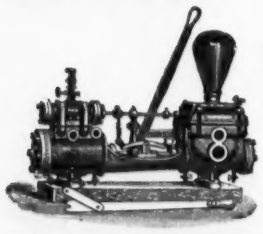

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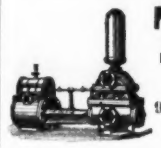

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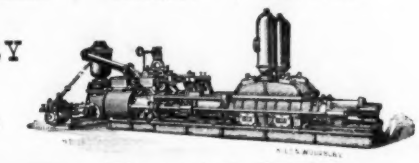

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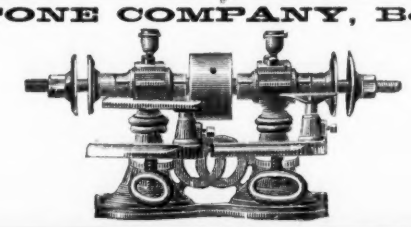

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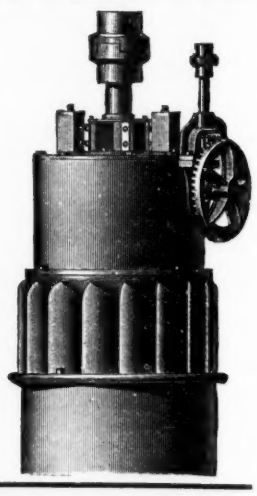

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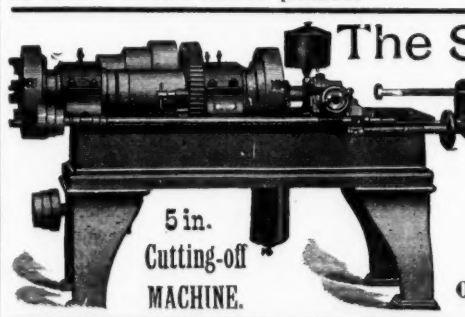

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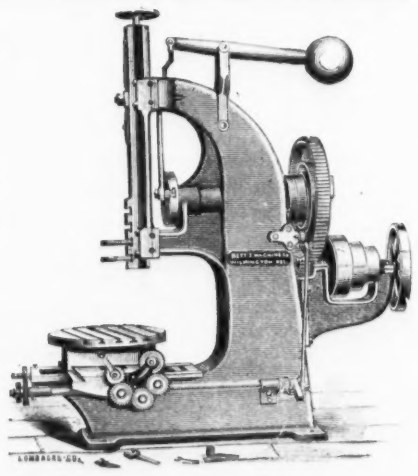

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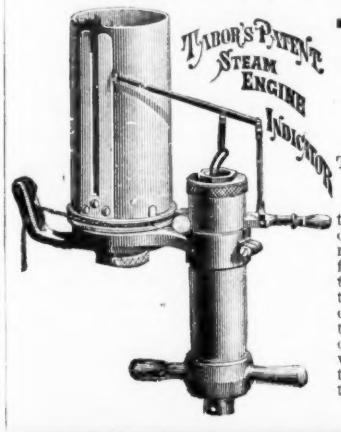

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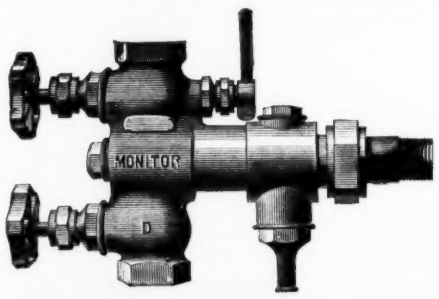

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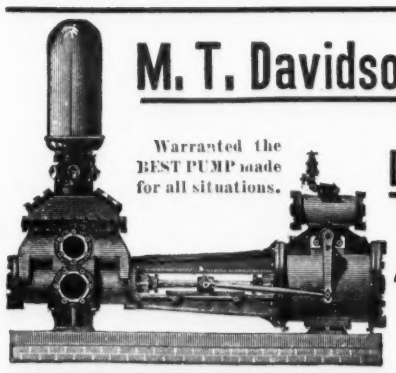

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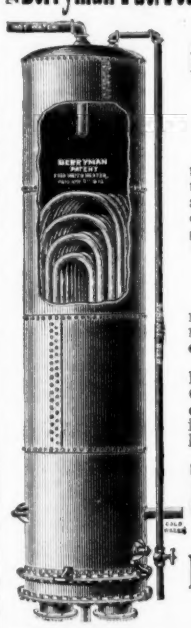

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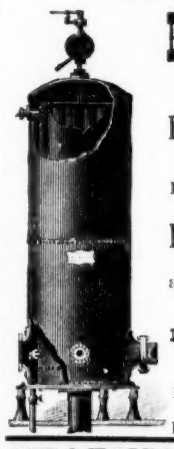

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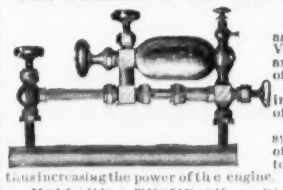

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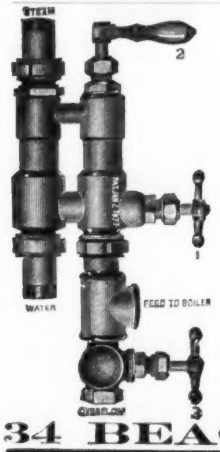

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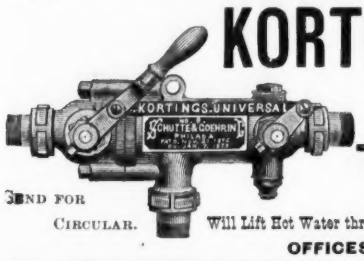

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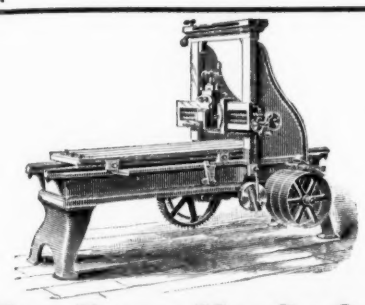

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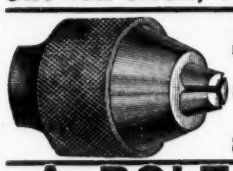

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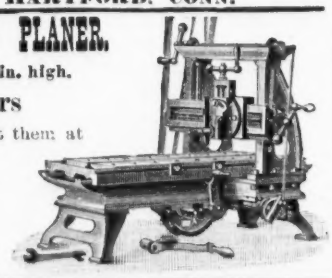

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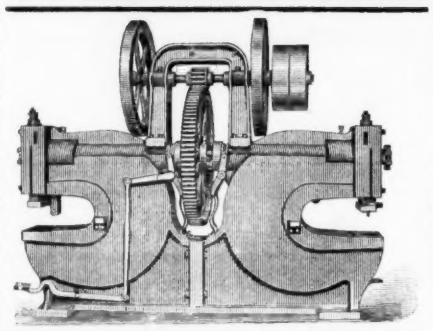

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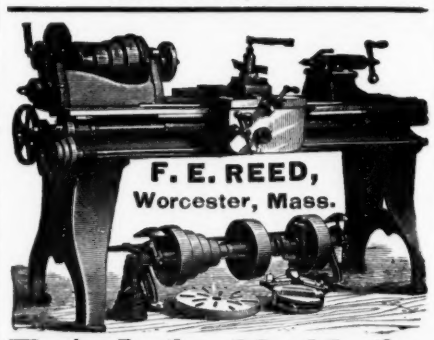

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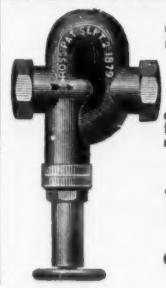

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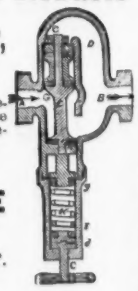

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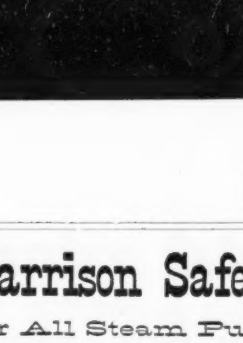

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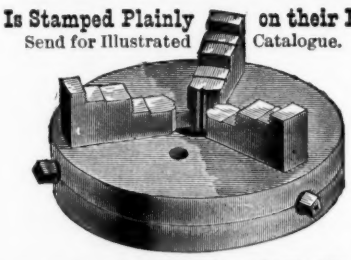

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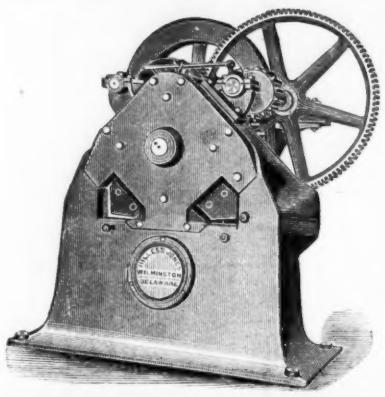

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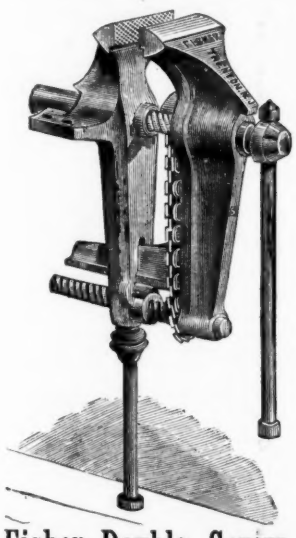

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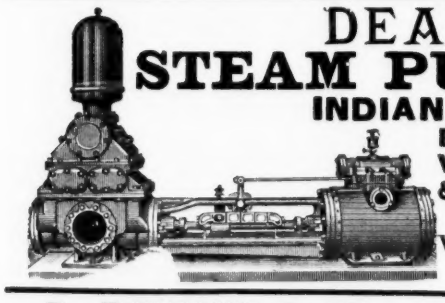

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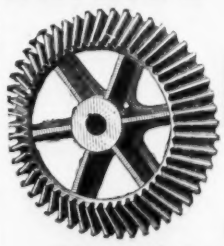

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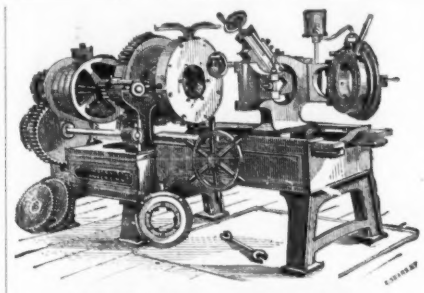

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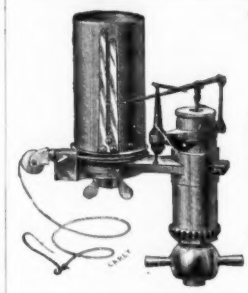

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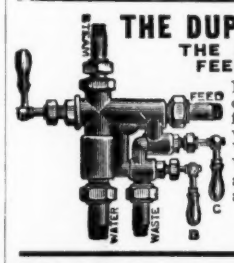

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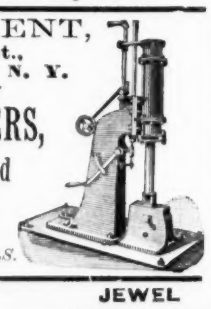

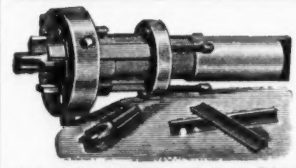

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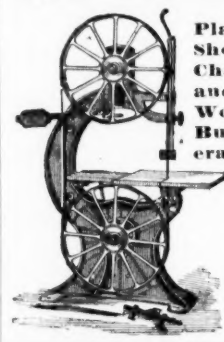

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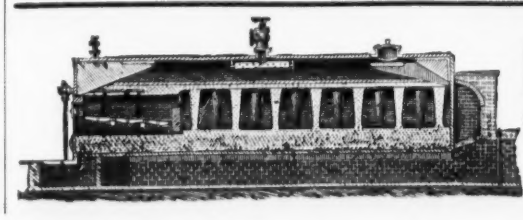

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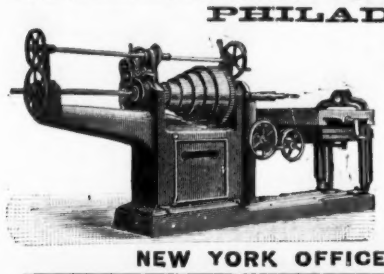

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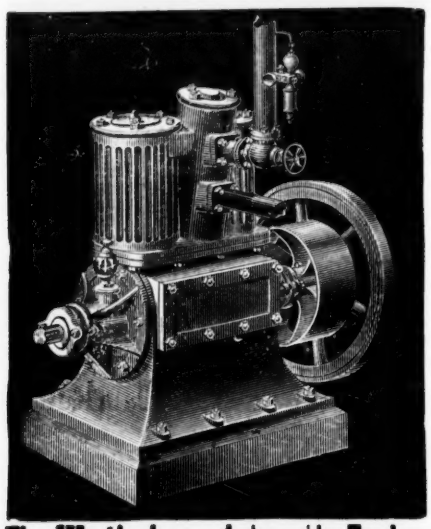

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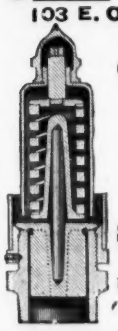

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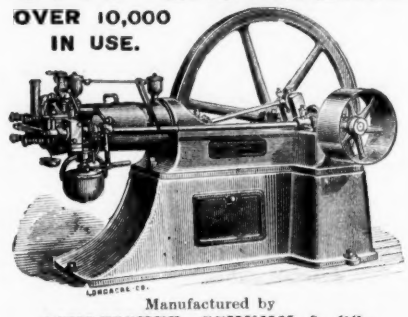

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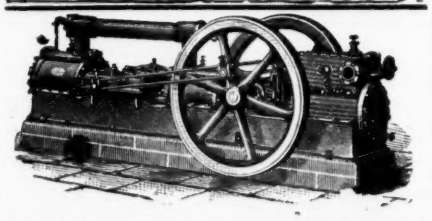

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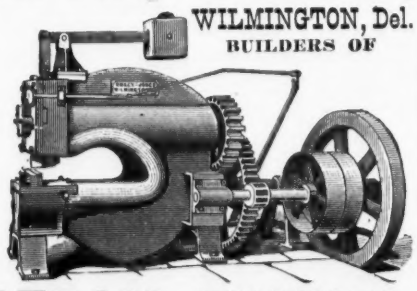

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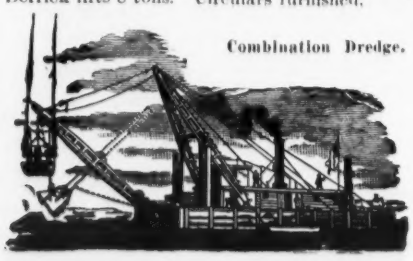
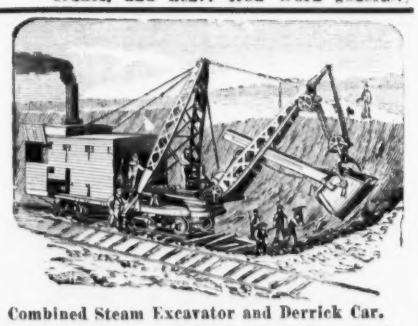


Combination Dredge.



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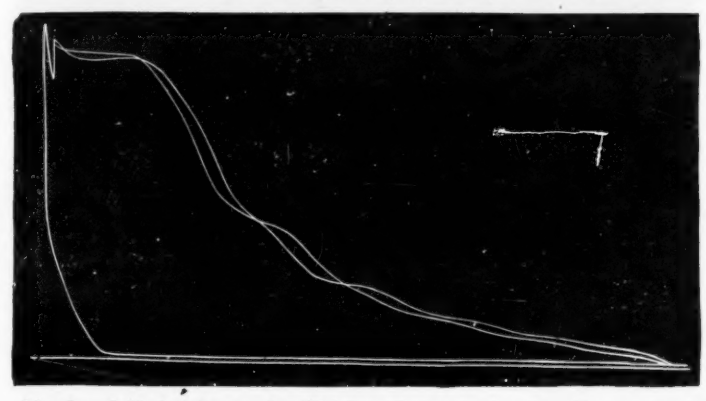

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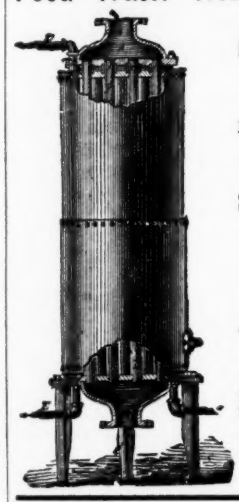

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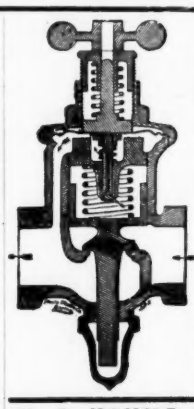

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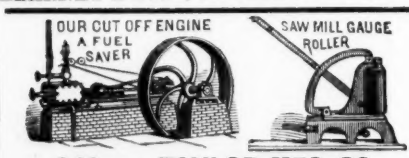

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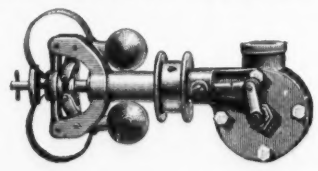

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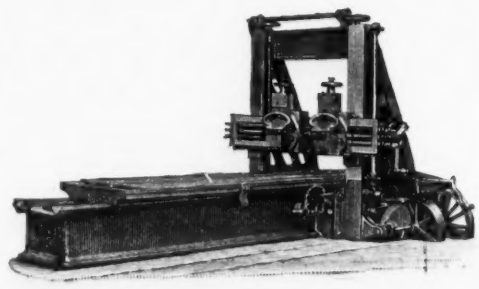

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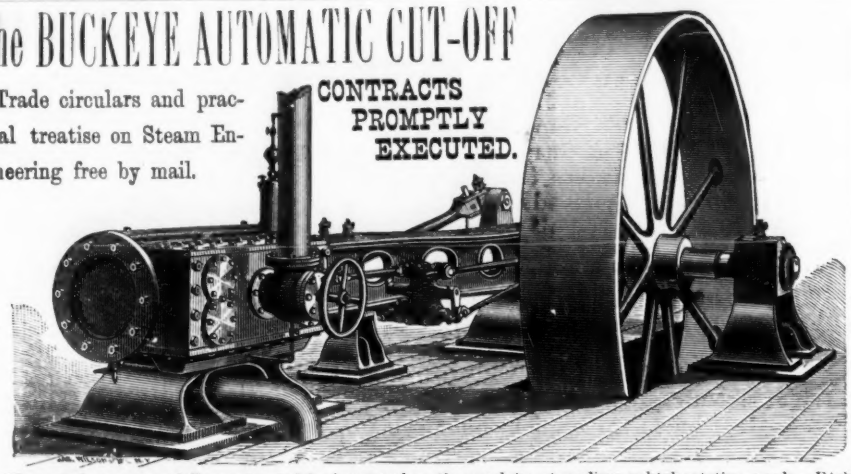

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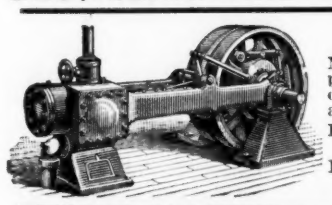

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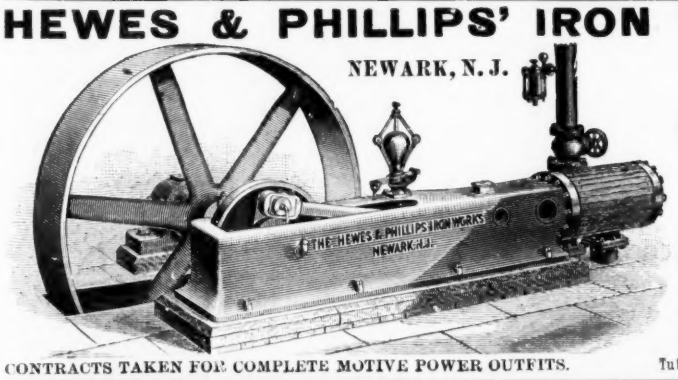

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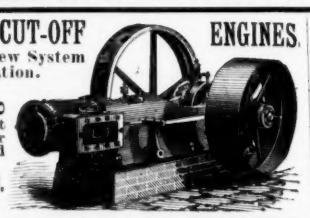

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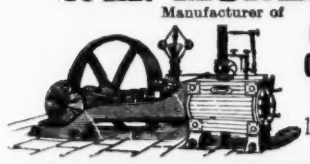

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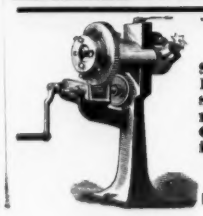

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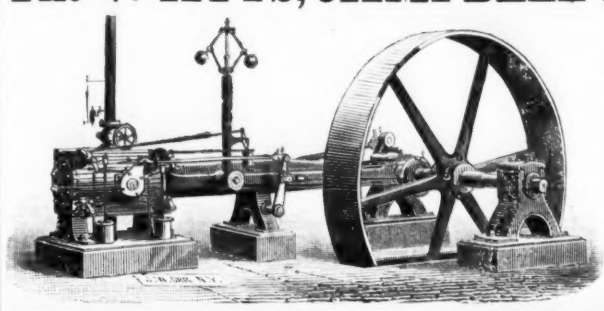

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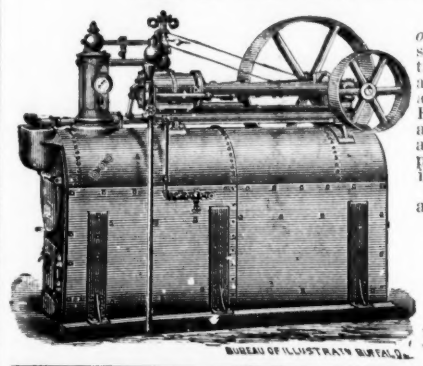

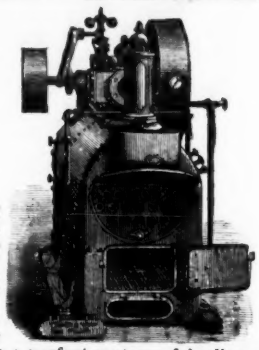

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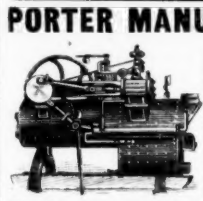

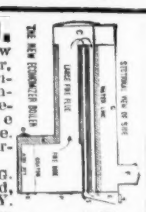

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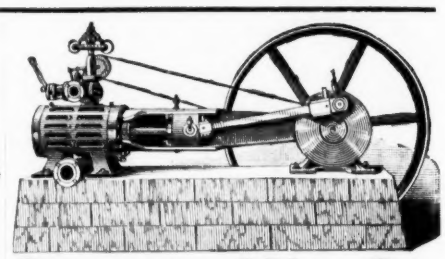

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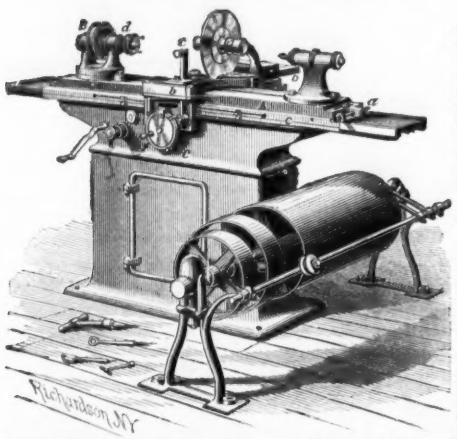
PATENT UNIVERSAL GRINDING MACHINE.

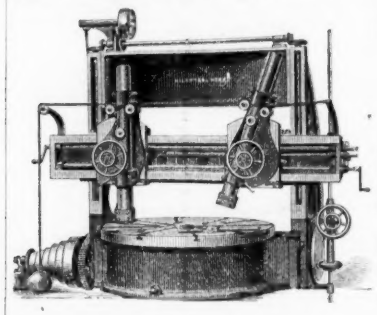


This Machine is arranged for doing a large variety of operations of grinding by the use of solid emery or corundum wheels. An additional movable table, capable of adjustment by a tangent screw and graduated arc, admits of straight and curved taper grinding with the centers of the machine always in line. It is specially adapted for grinding soft or hardened spindles, arbors, cutters, either straight or angular, reamers and standards, also for grinding out straight and taper holes, standard rings, hardened boxes, jewelers' rolls, &c. The work can be revolved upon dead centers or otherwise. The grinding wheel can be moved over the work at any angle, by which means any taper can be produced. Wheels from one quarter inch to 12 inches in diameter can be used either with or without water. The feed works and slides of the machine are covered and fully protected from grit and dust. The grinding of taper holes and angular cutters is provided for with graduated arcs. A special chuck for holding work to have holes ground, accompanies each machine. The spindle and boxes of the machine are of cast steel hardened and ground. Distance between centers, 28 inches; will swing 12 inches in diameter. The overhead works consist of a drum, tight and loose pulleys and adjustable hangers with self-oiling boxes. Countershaft should run 400 turns per minute. Tight and loose pulleys, 8 inches diameter, 4 inches face. Weight of machine, with overhead works, about 2300 lbs. Illustrated Catalogue sent per mail on application.

BORING AND TURNING MILLS

5, 6, 7, 8, 10, 12, 14 & 16

FEET SWING.



THE PRAY MFG. CO. reports—"Can bore and turn **a Pulley 8 feet diameter, 26 inch face,** trim the edges and face the hub in **8 hours,** handling included."

BUCKEYE ENGINE CO.—"Can bore and turn **a Pulley 12 feet diameter, 27 inch face, in 17 hours,** including handling."

PORTER MFG. CO.—"We are using your mill for **boring cylinders,** and find it does **quicker work and more accurate than any Lathe. Cylinders bored** on this machine are **absolutely perfect,** as near as we can measure.

NILES TOOL WORKS,

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BRANCH OFFICES:
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WESTON'S PATENT POWER TRAVELING CRANES

OF ANY CAPACITY.

Particulars on application and full specification and tender promptly submitted on receipt of capacity and span of bridge desired.

SOLE MAKERS:

THE YALE & TOWNE M'F'G CO.

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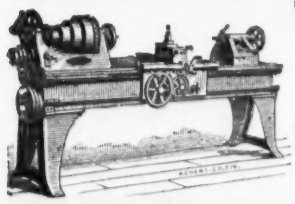

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NEW PATTERNS.

6 FT., 8 FT., 10 FT. AND 12 FT. BEDS.

NEW DESCRIPTIVE CIRCULAR NOW READY.

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NEWARK, N. J.

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139 & 141 Centre St., New York,

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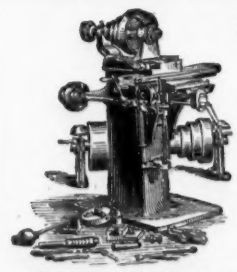

Milling Machines,
Drill Presses,
Hand Lathes,
Tapping Machines,
Cutter Grinders, &c.

SEND FOR NEW ILLUSTRATED CATALOGUE containing descriptions of the above machines.

THE PRATT & WHITNEY CO., HARTFORD, CONN.

Have Ready for Delivery:

Dilling Machines—No. 2 Upright, No. 3 Vertical; Nos. 1 and 3, Manufacturers and Manufacturer's Bench; Champion Drills; No. 0, 1 & 2 Gang Drills, 10 in. Pillar Shapers. 1, 14 in. Shaping Machine; Hand Lathes, 8, 12, 15 and 18 in swing; Cutting-off Lathes for 4½ in. diameter. Revolving Head Screw Machines, Nos. 1, 2 and 3; Hand Milling Machines, Nos. 1, 2 and 3; Power Milling Machine, Nos. 2 and 3; Bolt Cutters, Turret Head, Nos. 2, 3 and 4; National, Nos. 2, 3 and 4. Nos. 1 and 2 Screw Shaving Machines; No. 1 and 2 Screw Slotting Machines; 13 in. Plain Engine Lathes; 16 in. Weighted and 19 and 21 in. Gibbed Screw Cutting Lathes. One Double Connection Power Press. Index Milling Machines. Nos. 2 and 3 Horizontal Tapping Machines. Cutter Grinders. 16, 18, 20, 24, 26, 34 and 40 in. Planers. Drill Grinding Machines. No. 2 and 3 Die Sinkers; 10 and 18 in. Lead Tapping Machines; 18 and 38 in. Chucking Machines; Nut Tapping Machines. **Have increased discount on Combination Lathe Chucks;** quotations on application.

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Billings' Patent Adjustable Pocket Wrenches, 4 AND 6 INCHES.

FINISHED SCREW PLATES AND DIES, GENUINE PACKER RATCHET DRILLS, BILLINGS' PATENT DOUBLE ACTION RATCHET DRILLS, TAP & REAMER WRENCHES,

CLAMP, DIE & COMMON LATHE DOGS, COMBINATION PLIERS, BEACH'S PATENT THREAD-CUTTING TOOLS, BARWICK PIPE WRENCHES.

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AND ALL DESCRIPTIONS OF

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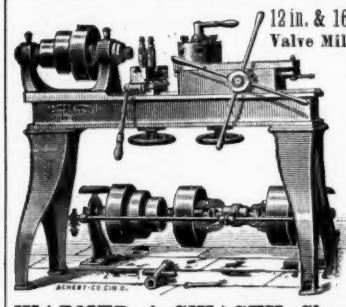

12 in. & 16 in. Monitors
Valve Milling Mach's
Double Key Lathes,
Speed Lathes
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Revolving Chucks for Globe Valves,
Two-Jaw Chucks,
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FROM 16 to 48 IN. SWING.

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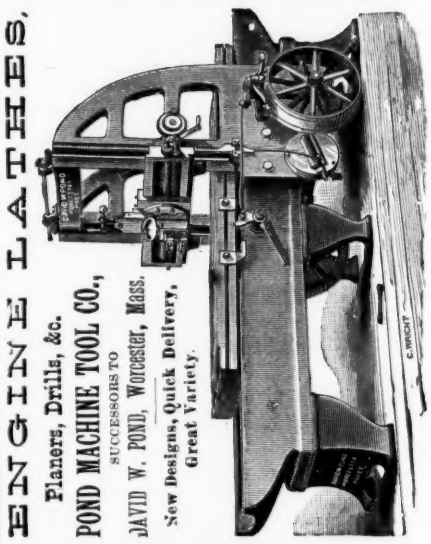
ENGINE LATHES,



Planers, Drills, &c.

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New Designs, Quick Delivery, Great Variety.

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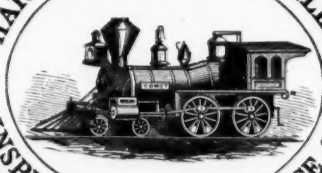

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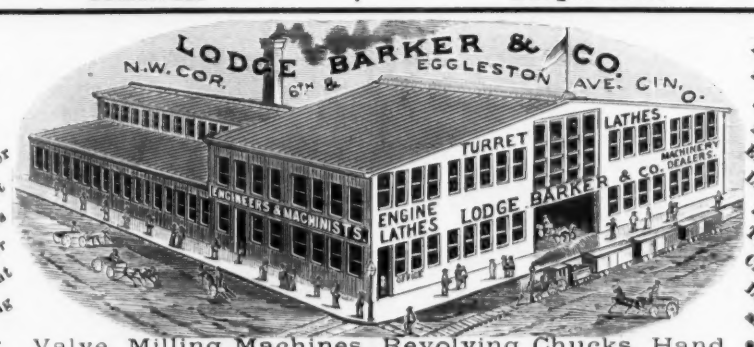

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18 in. 24 in. and 26 in. Engine Lathes and Turret Chucking Lathes always on hand.

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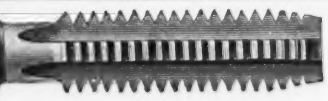

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